

AVIATION WEEK

DEC. 14, 1953

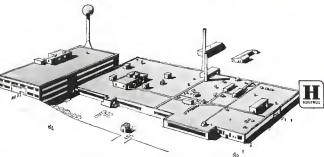
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They said

he was

too young...



Aviators of world renown had studied the project for years. They favored elaborate equipment, and crews of two or more. They were skeptical when, in February 1937, they heard of the plans of a certain single-seated young man from Missouri.

He made it in May—alone. The man they said was "too young" the man who had never navigated over the sea—landed two tons of fuel into an unrefueled plane and took off from a soggy field near New York. He had a compass and a pack of sandwiches. Thirty-three hours later he landed in Paris. Making history.

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RESEARCH KEEPS

B.F. Goodrich

FIRST IN NUMBER



B. F. Goodrich brakes stop fast fighter

REPUBLIC P-47 Thunderbolt lands on B. F. Goodrich brakes—brakes designed to arrest, save time, save wings. And made lightest to help save weight for the supreme fighter's career and gun.

A new kind of brake block developed by B. F. Goodrich engineers almost doubles the kinetic energy of the brake. By a light displacement with the brake compressed, an 11 means that a smaller brake can be used, cutting the weight way down. The brake also has a narrow entry ribe that gives more braking pressure with less fluid, and of course with more weight saved. And, because the expander ribe applies pres-

sure directly to the brake blocks, wear parts and linkages are not necessary.

The B. F. Goodrich Expander Valve brake does a better job of braking than any of the other brakes is possible on one man of the brake (wing). It provides full, positive braking down-slow to the metal locking. The landing action applies equal pressure over the full surface of the drum, giving better power, better load, faster braking.

Landings are safer and smoother with BFG brakes. They respond smoothly and quickly to maximum pressure, take emergency overloads better, cause less heat at high velocities than disc-type brakes used regularly. Retarder spring action

slows down wear due to drag. Retarding can be handled with a speedometer and wheels.

Aviation products in come from BFG's research and engineering include tires, wheels and brakes, bonded rubber, peroxide and electric de-ice, inflatable seats, Avitrol, Pressure Sealing Zippers, Pinlock adhesives, fuel oils, greases, wire-rope Tires B. F. Goodrich Co., Akron, Ohio, Dayton, Ohio.

B.F. Goodrich
FIRST IN NUMBER



ENGINE-DRIVEN G-E ENERGIZER, 38-volt, 330/1000 amps, mounted on 4-wheel trailer incorporates a completely self-contained power plant and weather proof housing. Shown here starting an F-4 jet.

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G.E.'s Rugged, Engine-driven Energizers Give You Mobile, All-purpose Power Source

SELF-CONTAINED, HEAVY-DUTY G-E power plant, driven by industrial-type gasoline engine, fills requirements for 38 to 35 volt aircraft ground power source.

HIGHLY MOBILE, this unit is mounted on special 4-wheel pneumatic-tired trailer. Operating independently of power outlets it is used for starting and servicing all types of aircraft in hangar, shop, or on the field.

VERSATILE GROUND POWER supplied by G-E Aircraft Engineers meets every need for starting jet or reciprocating engines, ground checking and testing of instruments, factory production testing, and auxiliary power supply for repair shops.

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LET G.E. HELP SOLVE YOUR

GROUND POWER SUPPLY PROBLEMS

GENERAL ELECTRIC



G-E Frequency Converter Energizer, 400-cycles (bottom)
G-E Motor-driven Energizer, 300/1000-amps 38-volt (top left)



New Type NC-8 Energizer manufactured for the Consolidated Diesel Engine Co., Stamford, Conn., equipped with G-E AC and DC generators and control.



Domestic

A Martin-built B-57A crashed near Belox, Md., last week while on an Air Force acceptance flight. A civilian Air Corpsman was killed and an Air Force pilot injured.

Thermal barrier will be solved within the next seven years, allowing aircraft engines to burn petroleum oil planes capable of 2,500 miles and faster, from only Muroy 3. Frode, president of Republic Aviation Corp. He mentions Republic's prototype F-105 as a "very high speed airplane you will be strong in 1965 or 1967."

Project Volcan, mobile automatic air traffic control developed by the Air Force Cambridge Research Center, last week led B-26 and F-86 into four separate routes near Boston in USAF's first public demonstration of its new system. Designed to handle up to 120 aircraft per hour to position for final approach and landing, Volcan-computed instructions can be transmitted orally to individual aircraft, transmitted to a cockpit instrument or fed to automatic pilots. (AVIATION WEEK Aug. 17, p. 21)

Allison J35-A-35 turbojets soon will power Northrop Aircraft's F-104, an engine change that is expected to increase the all-weather interceptor's maximum service ceiling to more than 45,000 ft. Northrop expects the preprototype improved Superion performance in all altitudes and speeds, boosted rate of climb and reduced fuel consumption during flight tests.

Turkey test facility will be built by General Corp.'s Allison-Massachusetts testing Division at Phoenix (Ariz.) for Turbojet Aircraft and operated under a USAF contract. Plans for the \$6,150,000 facility call for construction of 10 test cells for components of turbojets, turbofans and piston engines. Scheduled completion date Nov. 3, 1963.

President Eisenhower has appointed Ralph S. Duncan, president of Texas World Airways, and Preston B. Bennett, president of Sperry Corporation, to his Executive Board on the National Advisory Committee for Aeronautics.

Civil aircraft production since World War II has maintained output of military planes in the U.S. by 75,000 to 77,000—a ratio of more than two to one, according to Aircraft Industries Assn. Military contracts now account for more than 90% of the industry's



Japs Sign Beach Mentor License

American officials are now with Beach Airfield Corp. personnel in Wichita, Kan., following signing of an agreement granting Fuji Heavy Industries, Tokyo, to build the Beach Mentor military trainer (AVIATION WEEK Nov. 2, p. 7). Shown on the production line, where T-14 Mentors are being made for USAF, left to right: Michael G. Newberger, manager, Beach Export Division, E. Maeda, assistant manager, Aircraft Division, G. Ito & Co., Tokyo, Beach Export Division, Beach Administration Department, Kenji Shinkawa, Fuji vice president, and John F. Galy, Beach vice president-general manager. Fuji now is taking up on T-14.

business, AIA says, but civil planes still are rolling off assembly lines at a rate of from 12 to 15 every 24 hr.

Fairchild Engine & Airplane Corp. will purchase substantially all assets of General Control Corp. and operate the Waterville, Ohio, company in a separate division. Plans call for various production of Sparco units at Fairchild Engine Division, Farmingdale, N. Y.

Recent employment at Chance Vought Aircraft's Dallas factory today was 11,680 persons with an annual payroll exceeding 150 million, putting the World War II peak of 11,716.

Aerobionics Co. has received a \$176,000 loan from Small Business Administration, the maximum for individual events. The loan carries 6% interest, will be used for working capital and to help the California research group develop assist its mortgage.

New \$16-million air terminal at Philadelphia last week was dedicated by approximately 350 senators, civil, business and government leaders.

Financier

National Airlines expects to show net earnings of between \$15 million and \$17,718,000 for the fiscal year scheduled to end June 30, an increase of at least

\$1.5 million over last year, according to G. T. Baker reports. Included in the projected earnings: 34-million gross profit from the sale of two DC-4s and four DC-6s.

International

Two-engine Bristol 173 operated by Spanish Airlines in Casablanca, Casablanca and based in Casablanca 60 mi north of Madrid Dec. 4, killing 23 persons and injuring 10.

British aircraft exports increased sharply during the first 10 months of 1953 to \$174,345,000, compared with \$39 million for all overseas shipments last year. Total aircraft for 1953: \$143 million.

Sabena Belgian Airlines reports a net profit of \$26,747 during fiscal 1952 (now expiring) and miscellaneous revenues totaling \$17,805,552. Expenses added up to \$36,563,869.

Scandinavian Airlines System has ordered two additional Sud-Av Scandinavia transports, increasing its fleet of the two-engine Swedish airliner to eight. The new order calls for 1954 delivery.

Fairly T. Mr. S., new trainer version of the anti-submarine aircraft produced by Ferry Aviation Co. of Australia, is under instruction by the Royal Australian Navy.

INDUSTRY OBSERVER

■ Aircraft of Azusa, Cal., has developed a high-powered rocket motor using liquid oxygen and liquid hydrogen as fuel. Basic propellant combination has been studied on a small scale for several years but the Azusa project is the first time a large motor has been operated on this fuel. Azusa rocket has static testings.

■ Research Polytechnic Institute at Troy, N. Y., is developing a new type of aircraft engine aimed at overcoming principal drawback of current types—the need for rocket boosters to operating speed. RPI design encompasses a mechanical inlet valve and expander gasifier. Operating cycle resembles piston engine in some aspects.

■ Bell Aircraft Corp. reports successful experiments to alleviate skin friction at high supersonic speeds by injecting small quantities of liquid helium at leading edge of a wing. Liquid helium evaporates at high supersonic speeds, lowering the skin surface and reducing heat transfer to wing structure resulting from skin friction by about 50%.

■ North American Aviation, Inc., reports Sabre production is now operating at a rate of 36 fighters a week despite the United States X-150 strike. Stroud F-100 Super Sabre production model is nearing completion.

■ General Electric Co. Can Turbine Division has established a company center at the Evendale, Ohio, plant to handle complete installation of jet engine test data. Direct turbine tests the Lynn, Mass., jet engine plant where most development work is done, with the Evendale company center, and supplies test data while tests are being run. Answers are back at Lynn "before the engine cools," according to GE engineers.

■ Comparative direct operating costs per plane-mile of different types reflects the first half of this year, excluding depreciation, were Douglas DC-3, 41 cents; Convair 440, 35 cents; Martin 4-4-A, 45 cents; Douglas DC-4, 66 cents; Convair 240, 66 cents; Lockheed 449, 72 cents; Douglas DC-6B, 73 cents; Douglas DC-6, 74 cents; Lockheed 749, 90 cents; Lockheed 1049, 11.04; and Boeing Supercoaster 33-37. Figures are averages of flight reported to Air Transport Assn. by member airlines for their own domestic routes.

■ First official session of the Lolo sub-aircraft inside (American West) May 1, p. 33) was made at the recent American Rocket Society annual meeting in New York. C. E. Bartley of General Controls was called in for his work on the Lolo in answering the C. N. Holloman Award. Lolo is a sub-aircraft, lightweight sub-aircraft based on the German World War II T-10. Bartley works at the Rocket Division of General Controls which has been active in improving solid propellants.

■ Two big problems still facing guided missile manufacturers are recovery from test accidents and improving on the target in combat missions. Although some success are now achieved as "retrievable," a high percentage of the recoveries are actually early launches with little left of being equipment except scrap metal. Improving guidance comes when missiles are dived directly onto the target and experience structural failure in the resultant explosion due before hitting the objective.

■ Ray Barker, chief executive of the Curtiss-Wright Corp., estimates that the total weight of jet engines can be reduced by as much as 3,000 lb. by substituting titanium for stainless steel in their construction. Edgar Norris, sales manager of Electric Steel Corp., reports that use of titanium in jets for the Republic F-84F is saving 150 lb. in each engine and that from 700 to 1,000 lb. could have been eliminated in each plane if use of titanium had been anticipated in large turbine design. Norris says if other firms follow Republic's switch to titanium jets his firm would need 2,400 tons of titanium annually to meet current demand.

■ Martin Co. officials report that the Direct Kick atomic tests in Nevada last spring proved that subatomic missiles by helicopter are feasible with offensive use of atomic weapons.

WHO'S WHERE

In the Front Office

C. W. Williams has been elected vice president manufacturing of Garrett Corp.'s Aircraft Manufacturing Division, Los Angeles. C. W. Williams is now vice president of Garrett's industrial operations.

Randolph M. Lee has become director of the Heavy Aircraft Commission, second vice president of the American Society of Mechanical Engineers.

As Vice President of C. H. Sharp (USAF Ret.) has been elected executive vice president and director of Industrial Management Associates, Inc., Boston.

Philip E. Spindell has been elected vice president engineering of Truett Engineering & Engineering Co., Philadelphia, taking over Truett's engineering services for aircraft and other industrial fields. Paul Mueller is now vice president manufacturing.

John M. Shulman and Bert M. Hinch have been elected vice president and director, respectively, of Harbison Flying Services, Montreal, Canada.

Matthew J. Reilly has been appointed vice president-general manager of Aeroquip Corp., Jackson, Mich.

Reg. Gen. Luther S. Smith (USAF Ret.) has joined Truett Aeroquip Corp., Dallas, as special consultant to the president.

Changes

Lorenson F. Williams, former vice president of McDonnell Aircraft Corp., is now Washington representative for Pacifica Holdings Corp., Fairfax, Va.

W. C. O'Donnell has become general manager of General Electric Co.'s aircraft gas turbine department, Lynn, Mass. New on business machine managers: C. E. Plam, assistant; H. J. Searles, manufacturing; C. A. Newman, research and plant construction; William D. J. Webb, finance; W. G. Maddy, engineering.

Kenneth C. Gordon has been appointed manager of commercial sales for Boeing Aerospace Co., Seattle. Other changes: D. M. E. Morris, military sales manager; D. M. Taylor, domestic sales manager; Kenneth J. Logsdon, foreign sales manager; William M. Cook, senior project engineer for jet engine aircraft; Harvey D. Gunning, administrative engineer for the piston aircraft program.

W. C. Gage is now sales manager of American Division, Flinn Corp., Maywood, Ill.

Honors and Elections

Lewis E. Kilham, honorary vice chairman of New York Air Brake Co., has been elected president for 1958 of the American Society of Mechanical Engineers.

Dr. Marshall Black, assistant chief of Alcoa's Engineering Design Division, is new national president of the Society for Experimental Stress Analysis.

Edward F. Holloman, chief pilot for Cassatt Newspapers, has been cited by Civil Aeronautics Administration for his "valued contribution to aviation" during all years of flight.

CUTLASS ABOARD A CARRIER AT SEA

"Spotting a Cutlass"

The Navy's sleek, twin-jet F7U-3, with swept-wing folded, is towed to its spot on a carrier flight deck during tests at sea. The Cutlass is designed to be a top-performance member of America's Air Power team.



Chance Vought Aircraft

ONE OF THE FOUR DIVISIONS OF UNITED AIRCRAFT CORPORATION



World record para-drop—more men,
in less time from fewer planes

with the—Douglas C-124 Globemaster

New Douglas C-124 Globemasters of the 75th Air Force, 43rd Group, 7th Squadron, cruised above Fort Benning, Georgia, today, more than a thousand paratroopers had hit the air—some floating down on the drop nets.

For this record-breaking drop, Globemasters—the Air Force's largest operational transport plane—set a logical choice. Globemasters, based in the new, state-of-the-art hangar at Fort Benning, are the most modern of transport aircraft. They are the only aircraft in the world that can carry a gross weight of more than 175,000 lbs. A single Globemaster can transport 200 armed troops across the Atlantic—deliver 25 tons of supplies in one trip, and carry 100 tons of cargo in one trip.

Performance of the C-124 Globemaster is another example of Douglas leadership in aviation. Plans are being studied to quickly fly faster and further with a bigger payload in a longer range of Douglas aircraft.



Get in fly in the U. S. Air Force

Depend on **DOUGLAS** First in Aviation

Washington Roundup

New Political Issues

Adm. Arthur Radford's report on the three-month reorganization of strategic military plans by the new Joint Chiefs of Staff (see p. 20) is expected to stir up political controversy from three angles in the next congressional session.

• Democrats who opposed the review as unnecessary now point out that its main accomplishment was what they preferred last spring—a delay in the defense buildup. Radford and the new reorganization, with exception of resources for continental defense, "do not represent any material change from their developed in previously approved plans."

• Air power advocates, such as Sen. Lyndon B. Johnson, are expected to challenge the "balanced budget" concept. "The security and that of the free world cannot at this time be entrusted to an unbalanced concept of peace," Radford said.

• Democrats who pointed the tentative outlook in the Air Force goal from 143 to 128 wings will have additional reasons for the party's support. The new 127-wing goal, Radford held, "The threat of war has not diminished."

Army-Navy vs. Wilson?

Outlook in first Army, instead of Air Force, will be in the forefront in next year's budget battle as Congress for the first time in recent years. Army is opposing Defense Secretary Charles Wilson's plan for a 10% cut in its personnel strength.

A 10% cut in Navy's personnel force also is indicated. If construction of a controversial fourth Ford-class carrier is approved, Navy may take the reduction quickly. This year, Navy obtained funds for construction of a third Ford-class carrier and didn't put up opposition to Wilson's plan in other funds. Personnel cuts will not cut deeper into Navy aircraft procurement funds this year (\$495), than into Air Force's (\$175).

The fourth carrier, as well as other "major weapons," is going to be paid for by the Joint Chiefs of Staff, for the first time since USAF's determined opposition to the first carrier.

USAF Research Expansion?

Air Force will want on a major expansion of its research and development testing facilities, but probably will run into opposition from Secretary of Defense Wilson. The Administration has been notably penny-pinching in construction work.

Through the years, Army and Navy have accounted about research facilities Army has 41 major installations, Navy 21. Air Force has only seven, some not completed.

This year, USAF's request for \$175 million for new research facilities was cut to \$114 million by the Secretary of Defense. By reduction of funds, USAF received this to \$12 million.

Assistant Secretaries Organize

Progress has been steady, but slow, in developing the office of the three new key assistant defense secretaries. • Assistant Secretary for Supply and Logistics (Charles Thomas) received his duties following duties of the office in mid-August. Organization of the office was weak-

ened by October, a deputy assistant (Thomas Pike, former president of a California drilling firm), five directors and 11 staff directors. So far only one of the directors and five of the staff directors have been named.

• Assistant Secretary for Research and Development (Donald Gaudin), was directed in mid-November. Gaudin is now working out the organization of his office. • Assistant Secretary for Applications Engineers (Frank Newbury) has not received his charter. The intent of the office is to fill the gap between development and quantity production. Problems is to define his functions without overlapping.

ACC Survey Scored

An Administrative Committee's study on national aviation policy, which has been narrowed down to the civil aviation field, will be reviewed closely by some congressional quarters. Rep. Carl Albert, second-ranking majority member of House Insurance and Pensions Committee, observed:

"ACC was established to react on points which the various departments dealing with aviation had in common or in which there was conflict. It was not designed for the purpose of overall policy-making. That is not their business." They do not particularly represent the public viewpoint.

Military Fiscal Management

A Senate report in the near future is expected to demand tighter accounting control by the three services to cut unnecessary expenditures. Already drafted by the staff, it is now being reviewed by a Senate Armed Services subcommittee.

Spare Parts Buying

A Senate Armed Services investigating subcommittee may look into overbuying of aircraft spares and parts. Air Force last year took steps to reduce its purchases of spares, following criticism by Senate Appropriations committee that 65% of the purchase of each aircraft was for spares and parts.

Strategic Metals

Senate's Strategic Metals subcommittee, headed by Sen. George Malone, will contend in a report to be issued soon that the Western Hemisphere could be self-sufficient in all but one of the 70 strategic metals and minerals—cobalt and niobium. It will be pointed out that over 90% of these would sustain a substantial substitution effort. This stand runs into a snag with Navy's opposition of the prime importance of keeping the schemes open for strategic metals to sustain a war effort.

CAB Investigation

Top Administration spokesmen state that an investigation of Civil Aeronautics Board is a closed case as a result of 198 findings.

However, a spokesman for the Senate's Permanent Investigating Committee reports that as far as this group is concerned the CAB matter is "not closed."

—Katherine Johnson

Civil Aviation Faces Budget Slash in '95

- White House pares \$20 million from CAA and CAB budgets, scheduled to go before Congress next month.
- Major changes include elimination of federal subsidy for airport construction, reduced salaries, expenses.

The federal government will spend about \$39 billion more on aviation and airfare to civil aviation next year than the \$12.9 billion deficit of the current fiscal year, as Congress goes along with recommendations of the President and Commerce Department next month.

Major changes in civil aviation's fiscal 1995 appropriations and other legislation slated for presentation to Congress include:

- Civil Aeronautics Administration budget will be about 46% less than \$204 million cited by former President Truman a year ago and 18% less than the amount appropriated by the Republican Congress last session for fiscal 1994.

- Airport construction subsidy is eliminated. If request and later is decided negatively by the Administration, it will be reported as a supplemental appropriation. Congress will be asked to award the annual federal aid support program of eight years ago.

- CAA salary and expense budget will be cut from \$355 million appropriated for fiscal 1994 to about \$96 million. CAA will turn back about \$55 million of its 1993 appropriation.

- Other changes include cuts in salaries and other expenses in partial payment for CAA runway projects (Wayne White, Nov. 12, p. 71). The expected sequestration in Congress would cut out of CAA to the government by \$181 to \$25 million a year, depending upon the change that Congress enacts.

- Civil Aeronautics Board direct subsidies to airlines will continue at the \$68 million level of this year. But the federal request may appear about 14% less because there is about a one-month lag in the accounting as a result of the switch in payment of subsidies from Post Office to CAB appropriation (Aerospace News Sept. 21, p. 32).

- Nearly all direct federal expenditures for civil aviation are contained in the CAA and CAB appropriations. Appropriations for fiscal 1995 were \$118 million for all CAA activities (including airport aid legislation) and \$10 million for CAB subsidy, making a total of \$128 million. Additional coefficients

expenses such as administration costs leave the total about \$129 million.

Major reductions in the regular fiscal 1995 budget request of the President are about \$9 million in CAA salaries, expenses, and miscellaneous items, and approximately \$11 million in airport

• **No Subsidy:** The aviation industry will not be a federal impact next July 1 when the reduced budget would go into effect. This is due to the 14% slash in CAA expenses and proposed elimination of subsidies for airport construction.

Reason the transition will not be disruptive: Expenses uplink and subsidy programs already are being accomplished privately during the fiscal year.

CAA's buildup through its reduction from the \$115 million salary and wage expenditure rate of last June 30 to a planned \$96-million level for next year.

• **Appt. Aid Stalled:** Commerce Dept. president last year made congressional agreement to subsidize grants for new projects under the old federal aid program for the first time. Since then, CAA's Airport Office has been eliminated, and activity has been confined to administrative phase of the planned \$12.5 billion in previous contract commitments.

Airlines industry interests are trying to slow the program, in order to give them, through their activity on the Airport Advisory Panel of the Transportation Council—an industry committee advising the Commerce Department.

In an attempt to gain equality, the airport panel (delivered beyond the Dept. 1 deadline for the regular fiscal 1995 appropriation request).

The industry panel recommendations that be given to more \$250 airports over the next six years, that new airports generally be restricted to a single runway, and that no further money be allocated to terminal building construction.

Fate of programs may depend upon the Air Force recommendations of the President's aviation policy review by the Coordinating Committee—under the chairmanship of Commerce Undersecretary Robert Marry.

• **CAB Subsidy Unchanged:** The President's Budget request approved the current airline subsidy program of Civil Aeronautics Board. CAB is, in effect, an agency of Congress rather than the President, so influence at White House and Commerce Department is confined to long-term policy guidance and appointment of the individual CAB members.

If CAB continues approving subsidy rate increases to local service aircraft, as it has been since its Aug. 12 entry date of fiscal 1995 appropriations for Budget Review, a supplemental appropriation may be required later this year.

UAC Severing Ties With Chance Vought

United Aircraft Corp. in dropping of its aviation manufacturing operations and its increased plans to separate from its Chance Vought Aircraft Division, Dallas, Texas, subject to approval of common stockholders.

UAC chairman Frederick S. Smith and president M. M. Hanner have called stockholders that Chance Vought will set up a new company, operating separately from J. Smith & Co. will be asked to approve complete separation at their meeting late in April, and at the date it is to be effective.

UAC the transaction period is ended, expected by the end of 1994, estimate UAC officers will not be as broad members of the new company. At the end of that period, all United officers will resign from the board of the new firm, and there no longer will be "legal or corporate connection between the new company and United," the company says.

Other firms divisions of United—Pratt & Whitney Aircraft (Ipswich), Hamilton Standard (Properly) and accounts and Standard Aircraft (Baltimore)—will continue unchanged.

The UAC tie to stockholders points out that Chance Vought has sold orders for approximately \$775 million. Company currently is building the Navy F-777 C-130 Hercules, A-10 at that point. Regular general repair, and monthly new Army competition for development of a new advanced combat fighter.

Hanner cited two main reasons for the proposed separation. The present relationship with Chance Vought—under the United aircraft companies from taking P&W into their confidence be-

cause of competitive factors. Also, the proposed change would give Chance Vought more freedom in dealing with the Air Force and other potential military and commercial customers.

The period of the separation would depend on "voluntary" operations by the subsidiary in fulfilling its defense program commitments and all other responsibilities during the transition period. He anticipated no developments that would prevent continuation of the plan.

CAA Hampers Plane Development: Loeving

Designers and operators should be given a "completely free hand" in aircraft development and government constraints of certification could be eliminated "right now" with "light" civil aviation process and coordinate Greater Learning says.

Loeving, told National Aviation Trades Assn. that Civil Aeronautics Administration's rules and regulations are hampering development of new and more efficient aircraft by imposing upon designers an expensive procedure of testing, proving, by theory, electronic stress analysis and detailed drawings.

He points to the rapid development achieved in the automobile as an example of the "freedom of the firm," noting that cars never have had to undergo government certification.

• **Loeving for Government:** Loeving also says that "regulation and rules are not being done the fastest to government and particularly to government Air Force, Army and Navy aircraft that the public is an offshoot Air Force is over the growth of electronic aircraft and not on their wings."

He notes that the pool of fresh pilots, technicians and technicians aircraft has declined substantially. Industry and government have done a poor job of selling new aircraft to youth, he says.

• **Recused in Instruments:** William Lewis, head chairman of Lear, Inc., told NATA he believes every pilot could be able to fly an instrument before being permitted to a license.

"We're," Lear states, "accidents happen when the wings come off or the ship into the ground, which is another change example of the obvious changing of the book. The accident happened when the man went on instruments."

Proof of this being a fact, he says, "has in the second which shows that the greatest progress of this philosophy 'don't go on instruments' have been the most numerous victims."

During the NATA meeting at Wichita, Kan., Frank Sletten, Ph.D., and, as, was elected president of the association.

Third Quarter Aircraft Backlog

	On order	Backlog	On order	Backlog
	Sept. 30, 1993	Quarter's new orders	Aug. 31, 1993	June 30, 1993
Complete aircraft and parts	512,986	53,345	512,986	512,986
For U.S. military customers	11,715	712	11,715	11,715
Others	168	128	168	168
Aircraft engines and parts	5,179	470	401	5,934
For U.S. military customers	1,680	440	132	5,142
Others	190	30	48	188
Aircraft propellers and parts	361	4	48	305
For U.S. military customers	354	—	41	216
Others	27	5	7	27
Other products and services	616	318	375	922
Total	\$18,278	\$2,417	\$2,864	\$18,838

Aircraft Backlog: \$18.2 Billion

Aircraft industry had an \$18,278-billion backlog of unfilled orders at the end of 1993's third quarter Sept. 30. A part of the backlog of the Civil Aeronautics and Civil Aviation Administration, in which the backlog is \$18.2 billion lower than the \$18,325 billion reported June 30, end of the second quarter.

The backlog is 14% more than order on hand at the end of the third quarter of 1992.

Order backlog for complete aircraft and parts were 5% lower than the previous quarter, represented 55% of the total backlog. Orders for aircraft an-

guage and parts represented 24% of the total, were 2% below orders on hand at the end of the second quarter.

• **Third Quarter:** Orders for parts and services were 1% of the total backlog, were 14% lower than at the end of the second quarter.

National orders composed 94% of the backlog, 97% of the engine and 90% of the total aircraft propeller backlog, the report shows.

New orders during the third quarter amounted to \$1,417 million. This represented 8% of the total backlog at the end of the quarter.

Canadair to Produce Britannias for RCAF

(McGraw Hill World News)

London, Canada, Ltd., Montreal, will build a maintenance and support version of the five-engine Britannias for Royal Canadian Air Force, also known as the Britannia, Avro Canada, Ltd. (Aerospace News May 25, p. 77).

Licensing agreement calls for construction of an estimated 50 planes.

• **Powerplant:** General Electric Wright will certainly will get a contract to supply Turbo Compound engines for Canadian Britannias, British sources say.

RCAF requirements call for prolonged low-level search operations, and the Proteus 5 turboprop. Initial engine that will power the first batch of Britannias was an order for British Aerospace Avro Canada and Quantas Engines Avro Canada, could not show adequate efficiency for prolonged low-level flight, sources here say.

• **Prime Target:** When Canadian production will start still a single direction

son. Eventually, however, Canadair probably will build four Britannias.

Prime target for the civil planes would be the U.S. market. Advantages of single facilities for spare and repair are cited as points favoring Canadair production.

U.S. Must Perfect Missiles, Putt Warns

Capitol effort to perfect missile and effective missiles to protect the U.S. for "the state side war" is urged by U.S. Sen. Daniel J. Patz, chairman of Air Force's Air Research and Development Committee.

Unless that effort is made, Sen. Patz says, another war should then be fought that the U.S. "is really looking" is warning.

"This side to the concept of the hot war and the cold war is a third one of equal importance—the state side war,"

• **Radical Defense:** Looking into the future of rocket power, Patz believes continued investments in technological technology eventually could

ult of a study conducted by CAA to determine areas where duplicating and overlapping functions could be eliminated or reduced.

CAA member Joseph Adams orally presented to the order, arguing that because the Board's previous authority over nothing but unsolicited paper submissions to the agency case, there was no impact in the transfer.

CAA Denies Plan To Reduce Regions

Plans for a further reduction of one of Civil Aeronautics Administration's regional engineering offices were emphatically rejected by Administrator Paul B. Lee. Consolidation of the Kansas City, Mo., and Ft. Worth, Tex., regional offices was discussed during budget talks. Lee indicated that the two regional now will remain at four. The question was referred from order to four (14 Aviation Week May 11, p. 13).

Meanwhile, CAA engineers are competing work loads in the four regional engineering offices with the idea of reusing the engineering facilities at one of the regional headquarters.

► **Regional Headquarters**—Some officials argue that consolidation of these regions would be more efficient both financially and geographically. Headquarters of Region 2 and 3 at Ft. Worth and Kansas City, respectively, are situated close together.

► **Region 1** includes North Dakota, South Dakota, Nebraska, Kansas, Iowa, Minnesota, Missouri, Wisconsin, Illinois and Indiana.

► **Region 2** controls North Carolina, Tennessee, Alabama, Oklahoma, Texas, Louisiana, Mississippi, Arkansas, Georgia, South Carolina and Florida.

► **Region 3**, headquartered at Los Angeles, covers the greatest land area and the most dense population: California, Oregon, Washington, Minnesota, Idaho, Nevada, Arizona, Utah, Wyoming, Colorado and New Mexico.

► **Region 4**, with offices at New York, controls the smallest land area and the least population: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Maryland, Delaware, District of Columbia, Ohio, Kentucky, West Virginia and Virginia.

► **Reducing Expenses**—Reports of one consolidation of regional offices probably were dropped by industry-influenced nations still going out to personnel at CAA headquarters in Washington. Some industry attorneys at the regional office to reduce payoffs and expenses save \$9.4 million during the last six months of fiscal 1974.

Under Alfred S. Koch's direction, the Office of Aeronautics Staff has eliminated

Reds Retreat

The eastern zone of Communist activity has been abandoned as an operational area by the Red air force, according to military reports reaching American White.

Revelations by the news, especially admitted by Russian sources and technicians, is to tighten security. Reds claim all Communist air traffic and air is responsible to bring a new campaign into the area with new activity.

"The Americans know everything 24 hr. later," says one disgruntled Red.

Specifically, the air bases of Romania, Yugoslavia and Soviet Russia, which until recently supported large units of MIG-15 aircraft and the H-125 jets at attack bases, have been shut down. Commanded electronic gear has been moved, and tank-capped security units have been withdrawn. Only heavy forces of ground troops at these fields, the reports read.

is discussed in this column. It is Koch's policy (Aviation Week Dec. 7, p. 17) to delegate more authority to safety agents in the field who deal directly with the airline industry. Reorganization of CAA is expected to save CAA \$77,500 a year.

Plans to be dropped under the new order are E. C. Marsh, Region 1; J. M. Lewis, Region 2; L. W. DeWine, Region 3; and E. M. Jacobs, Region 4.

Because of their security, technical ability and position, the division chiefs will be assigned within their respective regions.

Union Outlook Grim In NAA Wage Strike

National Labor Relations Board last week threatened a charge by United Auto Workers (UAW) that North American Aviation has refused to bargain in good faith for a settlement of the wage warlock at California and Ohio plants.

UAW's making back another round from UAW in the strike entered its seventh week.

► **Strategic Plans**—The union's plans for an all-out strike were fought over restricted union members of the International Association of Machinists (IAM) at Douglas Aircraft Co.'s El Segundo plant voted to accept a concave offer.

Workers at Douglas-Santa Monica also decided against a national Lock-out Aircraft Co. and IAM last week.

unofficial agreement on a new contract.

However, in the industry, settlements based on the El Segundo pattern were being moved by Hughes Aircraft, Northrup, Rohr and other companies.

► **Thinning Pilot Lines**—Strikes of the strike were beginning to show within UAW ranks. The North American reported that 45,176 of NAA's total work force of 115,116 men had left pilot lines to return to their jobs as of Dec. 5. NAA's back-to-work talks: Los Angeles, 5,779; Irvine, Calif., 237; Culver City, Calif., 4,771.

One union official reluctantly admitted that "a lot of people are back to work." His prediction: The strike might not last two months longer.

CAB Blames VFR Flight in Bay Crash

Chief of the Western Air Crash Dec. 28 crash in San Francisco Bay Apr. 28, held in sight of the 10 persons aboard, probably was an attempt by the pilot to fly beneath the prohibited 500 ft. minimum altitude to maintain visual contact.

Civil Aeronautics Board finds.

The plane was coming from San Francisco Airport to Oakland Airport on a routine nonstop flight, providing for a 100 ft. minimum on VFR clearance. Coming in the middle of the day, the plane was in the water.

When the ceiling drops below 500 ft. on a time-honored, Civil Air Regulation requires the pilot to climb and descend to maintain clearance, rather than attempt visual flight below the prohibited 500-ft. minimum.

No evidence of aircraft malfunctions was found by CAA investigators.

PAA Stratocruiser Drops Engine in Flight

crew members of the Pan American World Airways Stratocruiser that landed on Johnston Island after dropping an outboard engine Dec. 4 were scheduled to return to Civil Aeronautics Board investigation in the modest last Thursday.

The transport last one of its Pratt & Whitney R-4368 engines 10,000 ft. over the Pacific about 700 mi. southeast of Honolulu, where it had stopped en route from San Francisco to Tokyo.

Seven baffling was experienced, investigation showed, as the engine severed from the engine. The plane immediately went out of control, but pilots were able to right the aircraft and fly 510 mi. to Johnston Island for a safe landing.

Nearly all of the lost engine is being ordered for investigation.

PAA Orders Seven Long-Range DC-7Bs

Pan American World Airways has ordered seven Douglas DC-7Bs, long range overwater version of the DC-7 designed to carry 52 passengers 4,000 mi. nonstop with nearly 1,000 gal. of fuel stored. The DC-7B first, to be delivered in 1975, will cost approximately \$14 million.

The planes will be powered by Wright Turbo Compound TCI1044 engines delivering a total of 11,000 hp.

The BMD model of the Turbo Compound differs from the present DA1 and DA2 versions in providing 100 additional Mev (megawatts) except additional power. The DC-7B's gross takeoff weight will be 125,000 lb. and fuel capacity will be 5,500 gal. Weight and fuel capacity are greater than for the DC-7N placed as domestic nonstop service recently by American Airlines (Aviation Week Nov. 30, p. 13).

PAA's new transport will be capable of flying from New York to London in slightly more than 18 hr., according to Nat. Bushell, Douglas vice president.

also. The DC-7B will be able to fly San Francisco-Honolulu in 7 hr. 45 min., Honolulu-Tokyo in less than 6 hr. with one stop and New York-Buenos Aires in 13 hr. 45 min. with two stops, says Bushell.

CAA Orders Fatigue Check on DC-6 Part

Operators of Douglas DC-6 aircraft were advised by Civil Aeronautics Administration last week they must inspect upper front ends of the aluminum bell-crank, tube located in the center wing fuselage section at Wing Station 179 at every overhaul period or every 1,000 hr., whichever comes first.

For some aircraft, fatigue has been found in the section of the aircraft. CAA's order is a warning device called for a 2,500-hr. inspection for such cracks. The revision to 1,000 hr. was made at the request of the Transport Aircraft Council, an industry group.

The director specifies that the inspection is to be made with an eight-power magnifying glass and/or the Dy-Chek

certified in the shoulder corner radius of the aluminum. If cracks are found, the part must be replaced before the aircraft's next flight.

An inspection must be made after the inspection is required to high parts on the ground which put previous stress on the section increased.

Lack of Orders Closes French Plane Plants

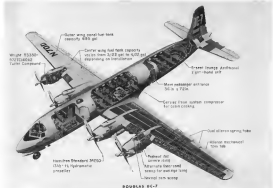
(McGraw-Hill World News)

Two-Two French aircraft builders will shut down plants permanently that month because of lack of orders.

► **Socata Nationale des Constructeurs Aeronautiques du Nord (Socata)**, one of the three big international aircraft builders, is turning its Bordeaux factory over to Renault Industrie. Socat employed 1,100 at the plant.

► **Matra-Sudair** is closing its plant at Palaiseau, near Paris, where 550 workers are employed. It will continue to operate its factory in Oyon, near the Spanish border.

Source closed to big plant at Le Havre



Inside the New Douglas DC-7 Airliner

First detailed interior drawing of new 400-mp. Wright Turbo Compound-powered DC-7 transport of the type being used by American Airlines in transcontinental nonstop service. A number of the features are being produced at Douglas Aircraft Co., Santa Monica, Calif., for AA (25), Delta-CAS (18), EAL (32), National (6), PAA (see story on page 5), and TWA (25).

last September, but will continue to operate less than full capacity.

Closing of the three aircraft reflects differences of the two firms in operating viable orders for the Next 2000 twin-engine transport and the M-575 jet trainer.

Army Calls Copter Top Freight Vehicle

Helicopters promise to develop into the service's top freight vehicle—both commercial and military, forecasts Army's air transport chief.

But Col. William B. Bunker told the recent fifth annual Air Cargo Day of the Aeronautical Society of Mechanical Engineers that copter builders must find ways to cut maintenance costs and improve design from a structural standpoint.

"There is too much airline philosophy and not enough thinking about the trucking technique," he says.

■ **Cargo Advantages**—Bunker says more than 55% of all cargo movements in the U.S. are over distances of from 50 to 100 mi., giving helicopter transport advantages over both fixed-wing aircraft and highway freighters.

He predicts that big rotary-wing aircraft, with capacities up to five tons, soon will be moving more than 25% of one and a half million tons of cargo in the field.

■ **Future Prospects**—James M. Glod, cargo superintendent for American Airlines, notes that air transport must work further development of services with greater consideration for air traffic.

Pointing up areas for improvement in three cargo operations:

- Simplification of traffic practices
- Application of modern material handling techniques
- **Airweight Packaging**—Heavy packages placed by the customer on proper packaging of freight prevent the shipment by air.

John Moscat, marine service manager for the Interocean Company of North America, says aircraft studies indicate air cargo shipments could be improved by development of containers that would consolidate small packages into one loading unit.

Such a container would have to permit rapid and efficient loading of consolidated service cargo and used loads, he says. But these advantages would have to be obtained at a low-weight penalty because of critical limitations of excess tow weight on airfields.

Moscat gives the summary of containers that are now available for air cargo.

■ **Advantages**. Time would be saved in loading light air transports and in handling materials at terminals.

Policy Deadline

Civil aviation policy review of Air Coordinating Committee for the President is moving along with early member agency working on "initial paper" for submission to the whole committee Feb. 1.

Written industry comments, due the end of this month, will be followed by brief individual discussions. Final committee recommendations to the President are now slated for Apr. 1.

- **Disadvantages**. Floor loading would be limited, prohibiting use of fork lifts and of capacity because of high tow weight.

Plane Repairs Return Top Fixed-Base Profit

Profits for major aircraft repairs are the single most important factor in profitable fixed-base operations, a survey by New York State's Bureau of Aviation indicates.

This branch of service is "practically ignored" by the operators who repair unserviceable airplanes, the study says. Key revenue producers are practically all of the profitable operators surveyed and from 55% of the unserviceable cases are flight instruction and plane rental.

The bureau makes no claim that following survey conclusions automatically would turn an unprofitable business into a money-maker, but it subjects these suggestions "with considerable confidence."

■ **Operations** are more likely to be profitable at a large airport than at a small one.

■ **At airports** of approximately equal size, the operator with the greater number of planes is more likely to be successful.

■ **Addition** of a good major repair department is "most highly recommended."

■ **Advertising** by all of the profitable operators, while only half of the unserviceable operators do so, "has an obvious impact."

■ **Flight instruction** and plane rental produce high profits almost everywhere it is offered and is a "must" for operators not specializing in it at the present time.

Some other conclusions reached by the pollsters that do not stand out as clear in the preceding and can be accepted only tentatively.

■ **Aerial mapping** and photography seem to be profitable sidelines.

■ **One and all**, told by nearly every operator surveyed, is a key revenue producer for only half of them.

■ **Alphabet sales** and service are leading revenue producers at many of the operations. Addition of a sales agent "should be seriously considered by operators now ignoring this branch of service," the report says.

■ **Charter service** and hangar storage are considered important by successful operators far more often than by profitable ones. It is suggested that the former consider the costs of these items to see whether expenses are covered—the put more effort into these other services that risk high at profitable losses.

No Strategy Change In New Year: Radford

The fixed 1955 military budget will not reflect any radical change in strategy, according to Adm. Arthur W. Radford, chairman of the Joint Chiefs of Staff.

Radford says the Joint Chiefs consider it "absolutely unnecessary that we make any recommendations for radical change" for the immediate future.

"The house recommended for the fixed 1955 budget do not represent any radical change from those developed in previously approved plans, except for increases we recommended for aircraft modernization," Radford reports. "They represent various levels pending formalization and completion of a long-term program which continues under study."

Air Transport Called Key to Africa's Future

Inland Africa's future development depends wholly on aviation, says A. F. Monroque, former governor of French Sudan.


Several years of study will be required to work out a profitable air cargo system, he predicts, but prospects are as colorful because of the study conducted along the coast for Senegal's fifth and next, set to be transportable now.


"Struggling bottlenecks of bad roads, long distances and the feeble capacity of the inland will be broken," he says. Monroque envisages the time when remote sections of the "Dark Continent" will be able to ship exports in coastal markets in a matter of hours.

N.Z. Studies Copters

(McGraw-Hill World News)

Melbourne—The New Zealand government has appointed a special committee to study the technical and economic aspects of helicopter operation in that country. Emphasis is on ability to carry fire fighters and equipment to remote bush areas.





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Business Flying

Piper Readies Apache Sales Push

Executive pilots soon will get a look at new all-metal four-place costing about \$35,000 fully equipped.

Early next year Piper Aircraft Corp. will send its all-metal PA33 Apache four-place on a nationwide demonstration tour to acquaint business pilots with the new four-seat four-engine executive plane. Piper will be ready to start deliveries in January.

The Lock Haven, Pa., manufacturer says it will have invested \$4.25 million in engineering, development, stress tests, FAA certification, tooling and materials in the Apache before it gets back a single dollar in sales.

► **The Market:** Howard Piper, vice president development, figures first with current two-engine model aircraft priced in the upper-five-figure bracket, a good market exists for a new two seater for \$35,000 and less.

That is the challenge to which the Apache is expected to answer.

► **Single-engine** plane owners and air men operators who are usually limited to daylight, VFR flight patterns Piper estimates that two engine equipment would double or even triple their current effectiveness.

► **Multi-engine** aircraft owners who resist the use of their DC-3-class equipment because of its relatively high operating cost, Apache would supplement their present Piper birds, and also extend operations into airports that cannot take the larger transports.

► **Price:** Apache prices will run from \$12,500 for the standard model having no radio, to \$15,375 for the Citation model, which is equipped with Lear ADC, Nivco Overmaster and Nivco Stinson. That configuration carries out low frequency receiver and ADF, two high frequency receivers (one with omni and the other with a tuning be-

quester locator), two VHF transmitters with a total of 20 channels, a weather beacon receiver and an ILS runway locator feature. Room for additional radio is provided.

The Super Contour will have an autopilot in addition to dual equipment.

► **Performance:** Performance is well as low price will be played by Piper in the Apache campaign.

The plane severely completed two months of accelerated day-and-night tests and has shown that fully loaded it has a maximum sea level cruise speed of 160 mph, at its optimum altitude of 5,500 ft., cruise speed is 145 mph. "Fully loaded" means with complete instrumentation, three radios, gas tanks full with 72 gal., and four 170-lb. passengers, 158 lb. of baggage and other equipment.

Single-engine rating is 1,600 ft. fully loaded, and 4,000 ft. with an average flight load.

The Apache will take off or land anywhere that a Tri-Pacer can operate, says Piper. The new four-engine business plane requires 900 ft. or less. CAA takeoff speed (just over stall) when fully loaded, but Piper says it has demonstrated its ability to get off after a 700-ft. run and requires only 670-ft. landing roll.

This performance is the result of a combination of Piper's modified US-158 high-lift aural action in a wing embodying 209 sq. ft. of area, the 180-hp four-cylinder, 215-cu in. Lycoming, constant-speed, controllable, full feathering thrust metal propellers, and a vigorous wing-saving wingtips that kept the Apache's empty weight to approximately 2,170 lb. when completely equipped with instruments,

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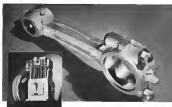
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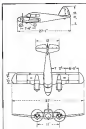
- ☐ ELASTIC STOP nut literature ☐ How it is designed for our product
☐ Reference book of fastener problems ☐ What self-locking fastener would you suggest?

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Piper PA-23 Apache

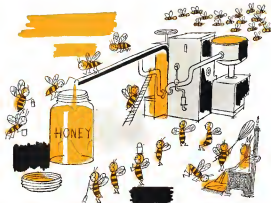
- Engine
 - 3-cylinder O-120 @ 150 hp. in.
 - Case weight 3,180 lb.
 - Empty weight (Custal) 2,150 lb.
 - Useful load 3,340 lb.
 - Spin 17 in.
 - Wing span 304 sq. in.
 - Length 27 1/2 in.
 - Height 49 1/2 in.
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 - Wing loading 17.1 lb./sq. ft.
 - Wheel base 73 in.
 - Wheel track 11 in.

wing center as possible to use many interchangeable parts. Besides the structure consists of a massive stepped down front spar, a rear spar, lateral stringers, stressed skin sections and readily detachable cowlings.

Attachment to the fuselage center section structure is by fitting at the side and center of the structure and the main spars are bolted together using high strength bolt fittings in the center of the fittings. This solution is effective provides a single continuous front spar, but allows easy removal of the wings when the plane is to be dismantled.

In the forward portion of the wings and fuselage there is a shock absorbing device, standard steel head suspension might set up critical drag. Elsewhere universal head rivets are used, except for places where shock riveting can be done using automatic riveting machines.

All internal or external aluminum parts of the fuselage are anodized and primed on both sides before attachment to the structure. After the airplane is completely assembled a coat of ready synthetic enamel is sprayed



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jet engine in Argentina were donated earlier by Dr. Kurt Tank, former Porsche Werk designer.

At 15 passages transport constructed of white wood. The Argentine government is emphasizing development of domestic resources.

• A wood three-piece steel plane.

• A three-piece glider for training, of wooden design.

• A two-place, all-wood advanced trainer, with an Argentine engine.

• Production of the JAME 35 bi-engine, multi-purpose trainer and light tactical aircraft, now undergoing flight tests (Aviation Week Nov. 16, p. 14).

• Jet Fighter—latest flight tests of the tank-designed Pulga 2 supersonic jet fighter "have been very satisfactory," reports the Argentine Minister of Air. The plane could go into mass production "very soon," he said. The Pulga 2 first was flown in June 1958 (Aviation Week Aug. 21, p. 21).

According to the government news agency, there has been considerable interest in Europe in the jet fighter, and the country is slated to send a mission to Argentina soon to investigate possibilities of obtaining manufacturing rights to the plane.

ODM Urges Higher Civil Plane Output

Expansion of commercial aircraft production and revenue plant capacity is urged by the Office of Defense Mobilization, which expects tax-related benefits in an executive order.

GDM declares that commercial plane production still is 5% short of the goal set. Aviation production capacity is 25% short.

Other expansion urged by GDM include primary aluminum, 12% short; aluminum sheet and plate heat treating facilities, 12% short; aluminum sheet and plate producing facilities, 5%; heavy aluminum aircraft forgings, 50%; titanium, 50%.

GDM says no further tax advantages for aircraft will be authorized for expansion of military aircraft production capacity, pending a review.

In an official order, GDM takes these actions as the 217 expansion goals set up to broaden the industrial base.

• Expansion for 120 goals already reached are based from further tax incentives benefits.

• Expansion for 49 goals—including military aircraft capacity—tax "penalties" and longer from tax incentives benefits but deemed "under active consideration."

• Expansion of the 68 goals still not reached are deemed "open" and GDM director Arthur Flemming invites industry to participate in meeting them.



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AERONAUTICAL ENGINEERING

Transport Trend Hinges on BOAC Choice

Carrier will likely pick next transport from these: DH jet, Bristol turbo-prop, Vickers bypass design.

By David A. Anderson

London—A decision which must be made by British Overseas Airways Corp. within the next few months is expected to have far-reaching effects on the trend of advanced transport design.

Five-Card Hand—The British carrier will choose the next addition to its post-war fleet powered fast from among a field of five entries. Vickers chose will shape the pattern of civil aircraft production in England for years to come, and will influence the designs of competing aircraft in the U. S. and other countries.

Each of the five airplanes is designed to roughly fit the same requirement. They are to cruise at high subsonic speed, and carry about 100 passengers across the Atlantic from London to New York coast.

But there the similarity ends. The available designs cover a wide range of arrangements, structural and powerplant variations. Perhaps most striking is the fact that three types of current gas turbines—the turbojet, the bypass turbojet and the turbo-prop—are all represented in the stretch of the contenders.

But BOAC has had substantial experience only with the turbojet powered de Havilland Comet, its turbo-prop fleet at Bristol Airways is scheduled for delivery soon, but not soon enough to make the airline in a position to make a decision before making its decision.

So the final selection will have to be based on calculated performance, economics and production rates, influenced somewhat by the limited experience with only two advanced aircraft.

► The Propeller—There are the five competing aircraft companies and their proposals:

• De Havilland, with the Comet experience under its belt, is developing an advanced piston-engine jet in its latest new design—powered with turbojets.

• Bristol, with extensive production experience with turboprops, is backing the development of a turboprop powerplant with an advanced Rotolux afterburner.

• Vickers-Armstrongs, holding a mili-



VICKERS entry in BOAC race is civil version of Vickers 1000 jet (model shown).



BRISTOL contender is advanced series of turbo-prop Britannia shown here.

tary contract for a jet transport prototype, is working on a simple civil version, powered with bypass engines.

• Avro, backing the design for the delta, offers a design for the Atlantic, a four-turboprop transport with the triangular geometry of the Vulcan.

• Handley Page, with a winner in the bomber competition, has adapted the cross-wing layout of the Victor to a trans-Atlantic transport.

Most technical observers are agreed that the final choice will be made from among the first three. But they emphasize that the choice will be more than just choosing a propulsion; BOAC will be choosing a powerplant, and perhaps even the type of traffic operations it will undertake.

For background on this important story, Aviation Week noted the de Havilland, Vickers and Bristol entries,

and talked to the technicians who are developing their company's hopes for tomorrow.

De Havilland

The accounts in the Comet line—the Comet 3—will be a different airplane, still powered by turbojet engines. The design should be finalized within a year, and the development is aimed at an entrance date of 1960 or 1961. Prototype cost could be underwritten as a joint venture by the company, work as well as the Comet and the Comet engine program.

"It reduces fairly to the type of service the airline wants to offer," Frank Lloyd, DH vice manager, "We see it as competition between that service and cheap service; they should always be enough demand for speed and

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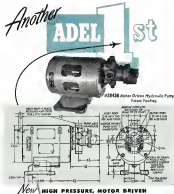
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the extra service to justify an overall like the Coast. We've never made an effort to offer cheap service with the Coast.

► **Flexibility—**Flexibility of the turbojet engine was one of the deciding factors in DH's choice to stick with that type of engine for its Coast X.

In addition, size becomes overhauls in high and going higher, overall cost is low. The company is talking in terms of 1,000-hr. engine life now, and sees no reason why this figure shouldn't go to 2,000 hr. The DH Coast requires about 100 hrs. approved for 750 hr. With about 30,000 engine hours racked up on the Coasts in the Coast's company has enough experience to quote overhaul costs on a realistic basis.

One objection to turboprops was cited in a company spokesman. He said that the problem of taking large amounts of power out through reduction gearing is difficult, and probably one of the biggest handicaps in that particular powerplant field.

► **Why a Jet Transport?** "We're in favor of the aircraft which has been chosen at the Coast and, therefore, at the jet transport," said Lloyd. "We have given careful attention to the problems of loading, strength and control."

Lloyd emphasized that loading and weight of jet transports will be lower—and therefore, so will the loading specs. All other things being equal—because of the large percentage of gross weight which is represented by the fuel weight.

Mounting of the engine wheels—on a system which permits the wheel to rotate as soon as the locked wheel begins to slide has been given a pass over, Lloyd said, but never should it still seem true distant. "A bit more chain isn't something," he added.

For future plans announced at Le Bourget emphasized that they were able to see the day of the Coast by holding the ones off during the loading and, that day was an effective in breaking.

See Aviation Week Nov. 16, p. 18.1. ► **Takesoff.** The same aerodynamic drag that is effective in a brake also works against short takeoff if the airplane is not maintained at its maximum drag. It's the only way speed is reached.

Lloyd stated that there are serious fuel keeping the airplane aerodynamically clean at takeoff, but declined to explain further, saying only that they would be on the Coast X.

The cockpit of the Coast X is a radical redesign now being developed jointly by de Havilland and Spry Aerospace Co. Ltd., based on a Zero Radar application.

Chief criticism of the Coast X's control system has been directed at the lack of aerodynamic feedback, such as that obtained in turbulent air with a

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its position on financing of the VC-7 civil version.

The reference date for the V-4000 could be 1957, having the same importance. A civil version could be brought about in a short time afterwards, so that possibly test deliveries could be made by 1958. This, too, looks like an accurate date with reference to 1960.

Bristol

A somewhat stretched reference in the hope of the Bristol company representatives will be based on the Olympus two-spool design, but will be generally about half the size. Although capable of much higher output than power, the engine will be rated at about 4,000 hp by itself. The reference will be the reference 100 L.R. unit.

The Stanley Hooker leaves no doubts as to the Bristol position in the civil transport picture. The company is behind the Olympus.

"Get as late as last year, and we'll recognize the reference and then you'll see," said Hooker.

Current turbo-prop development, from the Proteus 2 and 3 through an upcoming version Proteus 255 and will be the two-spool Olympus and its turbo-prop design derivative have added tremendously to the share of Bristol knowledge with that powerplant.

• **Turbo-prop development**—Hooker cited a company study of transport types designed to make the Atlantic crossing from either London or New York. A jet transport to do the job would cruise at the 100,000 mph. (100,000 mph) and would have a gross weight of 210,000 lb. A turbo-prop transport to do the same thing would cruise at 400,000 mph, but would weigh in at 100,000 lb.

On bearing problems, Hooker was optimistic. "We charge about 4% of piston engine overhead cost to the gear. That's three-to-one ratio, and would only have the equivalent of two sets of them in a jet turbo-prop engine. I can't see that gear has any great problems, other in maintenance or design."

Hooker was at variance with Vidler in his view on noise. He explained that propeller rotational tip speed would still be subsonic, and that the highest tip speed would not be as high as that of the turbines. (To this observation, the reference is the world's quietest large airplane. It has to be heard to be believed.)

Hooker also pointed out that the turbine cut velocity would be around 1,200 ft. on the reference, whereas a jet it would be twice that.

• **Constant Power**—One of Hooker's



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big talking point is the type of power curve the Chicago-developed has. In a graph of brake horsepower against altitude, the conventional turboprop power curve falls off heavily, with the engine value at sea level.

Broder proposes to use the turboprop at considerably under its full-throttle capability for takeoff. This would give a rating of about 4,000 hp. Then at the airport climbed, the throttle would be opened to keep constant power up to an altitude on the order of 15,000 ft.

At this point, the engine would be on the full-throttle curve, and the power would decrease linearly at con-

stant throttle setting from there on up. At 16,000 ft., the engine would still be putting out about 3,000 hp.

► **Advantage**—This kind of a power curve has two advantages. It guarantees constant takeoff power, regardless of airport altitude or temperature; the operator will always be able to get 4,000 hp out of each engine. It gives a much higher altitude cruise power than an engine capable of only 4,000 hp at sea level.

Broder plans to keep the present gearing and the present propeller used on Babcock's P-26 turboprop.

There's considerable work in the Birmans hangar yet, and our com-

pany spokesman. Currently pegged at 114 ft. as the Mark 108 size, the length will be increased to 124 ft., 3 in. as four versions. This results in a proposed body length of 97 ft., 9 in.

The wingpan of the series will stay at the current value of 140 ft., and the height remains at 36 ft., 5 in.

Engineer Demand Off, Starting Pay Up

The employment of engineering graduates continues at a high rate although the demand seems to be slackening. Starting salaries show increases over the usual offerings for last year, according to the Engineering Manpower Commission of the Engineers' Joint Council.

A group of company representatives was asked recently to compare their engineering graduate requirements for 1954 with those for 1953. Of the 143 companies surveyed, 24% said they wanted lower engineers. A year ago, only 10% of the surveyed group wanted lower engineers. The rest, 52% want the same amount, and 39% want more engineering graduates. The figures for last year: 16% wanted the same, 37% wanted more.

► **This Year's Offer**—But salaries offered have gone up, the 1954 offering lists without previous increases in electrical equipment.

► **8%** specified a figure between \$101 and \$125 monthly.

► **14%** specified a figure between \$126 and \$150.

► **14%** specified a figure between \$151 and \$175.

► **Last Year's Offer**—These were the amounts in the median last year.

► **42%** specified a figure between \$101 and \$125.

► **43%** specified a figure between \$126 and \$150.

► **6%** specified a figure between \$176 and \$195.

The same salary for 1954 as in 1953 was offered by 77 companies; 61 companies specified that would offer a higher salary. Not one company indicated it offered a lower salary.

The majority of companies reported that they faced between 35% and 100% of the number of men that they tried to hire.

Copter Convert

A retinue of 35 men of forward-looking agricultural aircraft operation has taken delivery on a new Bell 47G helicopter, which he will use for crop dusting in the fifth unit built around Lake Chapala, Mex.

The operator, Allen E. Platt, is taking helicopter instruction. The 47G is fitted with dual controls and dual type landing gear.



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SOLID SUPPORT will be given should it be concrete base, there going into place.

The troublesome tying problem of establishing a sturdy, reliable and relatively inexpensive tie base for B U structure has been solved effectively by Boeing Airplane Co.'s engineers. The simple answer is a reinforced-concrete foundation to hold permanently the adjustments of the steel tie supports.

The combination of concrete base and steel deck has been in use for a number of months on Boeing's B-52 production line in the assembly of

the Statkraft's station. It replaces the conventional steel box truss with a steel jig. Obvious, watching the new assignment work out, already see the jig of the future as a combination of concrete and steel.

► **Affords Stability**—Frame job of the concrete base is to give the extreme structure the stability it needs for the electroless manufacturing demanded on the B32 production line. It not only performs this function, but can also do a number of other jobs.



SLANTED BEAM (Top) bubble B-12 stitches during final assembly at Boeing Seattle

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portant deadends as well, according to Klossing.

The concrete area has demonstrated its inherent stability with results of careful checking of 8-12 submembers by optical means. The concrete base is reported to be even more stable than the factory's concrete floor. It provides a damping effect on the vibrations of machines and trucks, thus preventing the piling of even some jet parts supported on the base.

By contrast, vibrations affected the conventional base-and-steel jet construction, tending to cause it set at adjustment.

►Thermal Expansion—Low expansion characteristics of the concrete also contribute significant resistance which would result when steel jet supports are subjected to temperature changes which could occur when the factory's hangar-type doors are opened.

The superiority of this low-expansion characteristic is emphasized when it is pointed out that displacement of a single assembly jet of as little as .02 in. will require readjustment.

Reduced cost is another category



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Designed as an air distribution system for pilot cooling, the British ventilated suit is worn between pressure suit and other safety equipment. Suit plugs into cockpit air supply, distributes and recycles to about 300 inlets around the pilot's body. Developed by Institute of Aviation Medicine, the suit has been prepared for production by the G. G. Fitchett Co., Ltd., Woking, Surrey.



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where the concrete-encased production pipe pay off. Boeing reports that the cost is about three-quarters that of the conventional assembly pipe with their beam of steel.

• **Cost Advantages**—The concrete base consists of a central 16-in. diameter and 12 smaller pipes spaced up to 18 in. at the same angle as the B-57 stabilizer trailing edge. Although the contractor had no previous experience with ig building, Boeing says, the concrete rig supports were constructed with more accuracy, at one-third the cost and in one-quarter the time it would have taken to build a comparable steel base.

With the conventional offset arrangement, complexity and cost increase directly with size. Foundations as large as large (over 100-in.) beams that are reinforced, then fast bolted for stress relief, finally sitting up in a precarious job. Each step is an expensive procedure.

• **Release Space**—Factory floor space saving is another important dividend with the concrete base. In the new setup, two stabilizer pipes are mounted on one concrete base, reducing by one-third the amount of floor space originally allotted to accommodate two stabilizer pipes.

The doubling-up arrangement such as done on the concrete would not be advisable with a steel base, because the external would transfer expansion and contraction from one rig to the other.

Only drawback seen for the concrete base in the working operation it would require for disposal. Jackhammers probably would have to be used to break the concrete and tendon applied to cut the reinforcing bars.

Three New Alloys Offered to Industry

Three new alloys are being offered to industry in a trial marketing test by the Reynolds Corp., Reading, Pa. These are the new alloys under development for use in the demand will warrant production as a commercial trade.

• **Zirconium magnesium**, intended for use in the production of aerospace alloy castings. The material is advanced in a readily alloying manner for bending, dog, spiral, with a maximum strength of 34-47%.

• **Manganese aluminum**, offered primarily as a manganese additive to titanium alloys, but also used in having manufacturers in the aluminum alloy field. The material has equal parts of manganese and aluminum.

• **Titanium manganese aluminum**, also applicable to the titanium industry, is aimed at introducing capabilities for new alloy properties. It consists of 30% manganese, 30% aluminum and 40% titanium.

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How Automatic Engine Factory Works

• Machines double output of Wright Turbo Compound powerplant in half the space, improve quality.

Fresh evidence that Curtiss-Wright believes that's plenty at its 100th anniversary is the new "automated" production line at the company's Wright Aircraft Division, Wood-Ridge, N. J.

Disputed as the first of its kind in aviation engine history, the new assembly scheme, with its extensive use of automatic machinery, is Wright's justification for present and projected production requirements for the Turbo Compound version of C-W's basic B3500 powerplant.

• **Automatic Savings**—The new line already faces three benefits:

• Two engines are being produced for every one previously turned out on the old hand-assembled line. The top potential of the new line will permit even greater output.

• 40% less factory space is needed in comparison with former production techniques.

• Quality achieved is superior in precision to skilled labor-plagues.

• **High Potential**—C-W's chairman and president, Roy F. Heiler, sees the Turbo Compound engine competing with the jet in commercial transports for the next 10 to 25 years. *American Week*, Sept. 28, p. 16. Heiler envisions another round of piston-powered records with cruise speeds around the 450 mph level.

To meet that potential market and to assure that lack of skilled workers would not prove a hindrance, Wright engineers created the automated line. It is geared to the production of Turbo Compound in the range of 1,150 hp to more than 3,500 hp—units ordered by 22 airlines and the military.

While the Turbo Compound was the last basic piston engine Wright documented build, the new engine itself is even capable of further development. The automated line at Wood-Ridge can be adapted to take care of these higher-power versions.

• **Old vs. New**—On the old assembly line, almost all work was done by hand. The only automatic feature was the basic conveyor mechanism for moving the work past the 25 assembly stations according to a set time schedule.



COMPLETED TURBO COMPOUND is slowly being moved into position hydraulically for attachment in pre-drilling, which checks oil flows and location.

On the new production line, hand jobs are held to a minimum—merely maintenance tasks complementing the overall machine operation. Some idea of the efficiency of the automatic using is evidenced in the fact that some of the equipment is up to 500% faster than the best handwork on an identical operation. Automatic machines on the line were designed by Wright engineers in cooperation with Heiler Engineering Co., Detroit, which was responsible for their construction.

A key feature in the automatic assembly scheme is the full utilization of conveyor lines and pallets to move parts with a minimum of handling to the automatic stations. Total number of pallets employed is 1,150, com-

prising about 45 specially tailored, different types. Each is patented with contours varying in kindness according to the weight of the part it supports.

• **Automatic Operations**—Some of the extraordinary automatic operations on Wright's Turbo Compound line are:

• **Assembly of base parts** for beginning of engine buildup. First, assembly of the engine begins by clamping the three crankshaft sections in a special assembly machine. The master and connecting rods are placed in position and the machine automatically clamps the parts into a unit, and at the same time positions the required clearance and bolt stretching.

• **Running and torquing of bolts** and

Along Curtiss-Wright's 'Pushbutton' Assembly Line . . .



BASIC ASSEMBLY JOB—an automatic machine puts pistons into holes and attaches, and secures and retightens rods into unit embodying proper clearance.



VALVE SPRINGS are bolted, oiled, set and in position after job.



BOLT TIGHTENING, TORQUING is automatic for such operations as there is engine's first crank section (left), securing master plate toward pistons (center), locking retention gas drive on power section (right).



PISTONS and cylinders are mounted in connecting rod in extended and retracted mounting rod is turned to make.



TURBINE WHEEL, has its shaft stretched and set tightness. Turbine includes three of these wheels.

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can patrol far beyond our borders for long periods of time.

THE SECRET ARMS—Detective features of these Lockheed Super Constellation jets are the engine instruments which provide "radio eyes" and "ears." For the U.S. Navy and U.S. Air Force, Combined with range and altitude flexibility, the aircraft America's productive radar far beyond the sea level horizon is sound for alertness and early warning.

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Important member of the Lockheed defense team are these three airplanes:

1. **EARLY WARNING**—Lockheed Super Constellation, with distinctive radar loops, are "flying radar eyes" capable of hovering long hours at high altitude far beyond U.S. borders to warn against attack. (Called W-3 by Navy, W-3C by Air Force.)

2. **FLIGHT DEFENSE**—For long-range, long-endurance patrols in lower levels, the Navy uses F-4V Neptune fighters, especially designed to protect U.S. coastline from sneak attack by submarine-launched missiles, rockets, and torpedoes.

3. **SEA-WARDEN AIR INTERCEPTION**—While look for Early Warning Aircraft and the F-4V Neptune are on constant patrol, Lockheed F-4 Sea Star jets are based at strategic continental points, ready to intercept any intruder in daylight or darkness, regardless of weather.

Even today in air firm as the toughest behind it, and other Lockheed models in production worldwide around the globe. These include the T-11 Jet Trainer (Navy, TV-4) in which over 100 of our jet pilots were trained, and the G-12 military transport, only transport designed from the ground up for turbo-prop power.

PLANE FOR TOMORROW'S FIGHT—Several new Lockheed models will be ready early next year. One of these will be the XF-104 Day Supersonic Fighter. Others are not even in the sketch stage. And designs as to 15 years from now are now taking shape in research by a special corps of engineers-scientists at Lockheed.

auto. These important operations are done at various stations with maximum speed and accuracy. Some examples:

An automatic machine tightens the bolts on the cylinder plate surrounding the cylinder poppet valve on the engine's front section.

Bolts are tightened automatically on the engine's front cross section.

Positioning and tightening of bolts is automatic for joining the upper housing to the rear crankcase section.

An automatic machine runs and tightens the rods for attaching the connecting rods to the master rod.

Reduction gear pinion bolts are set automatically to identical value and the bearings holding them in place are engaged at the same time.

The large reduction gear drive of the Turbo Compound's power section is tightened and locked in a single automatic tool.

On cylinder assembly, valve springs are set on a special machine. A push-button runs the machine for depressing the spring to allow the rocker arm to be dropped into position.

• **Piston, cylinder blockup**. Assembled engine units mounted on vertical railings slide into clamped to special machines, one accumulating four-cylinder pistons and cylinders, another for the next row. Each machine indexes the engine assemblies so that the cylinder-mounting unit is in position to work on the next assembly simultaneously. The crankshaft is rotated to index the number and retarding rods automatically to put each rod in the installation of piston cylinders.

• **Turbine wheel inspection**. Turbine wheels of the engine's power section have the wheel not tightened and the turbine shaft stretched in an automatic operation.

• **New Plan**—The finished engine unit is the supply point for the engine assembly plant. It can accommodate major sections for about 170 Turbo Compound and minor sections for about 400 of the engines. Thus a sheet 30% more engine parts than were stored in an equivalent area previously.

Major components—cylinder head and piston, main bearings, connecting rods and master link pinion—enter from finished stock on common roller conveyor to a loading area. Also, parts are arranged on pallets, ready to convey to work benches, then conveyed to the "crane" assembly benches and stations. (The final line for engines assembled after test and overhaul, discharges the turbines of the engine, power line.)

Nuts, bolts, size and other minor parts are moved to given assembly stations by rolling bins.

► **For Line Work—Subassemblies from**

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OR RIVET

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- 3 With Locking Tool draw barrel over shoulder of LOK-SKRU, and push down until the barrel is flush with the surface of the work.
- 4 TO FASTEN ATTACHMENTS (nuts, washers, etc.) draw barrel over shoulder of LOK-SKRU, and push down until the barrel is flush with the surface of the work.

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How Parker tank-mounted valves save weight by allowing 25% smaller fuel line sizes

"When you specify fueling equipment, you've got many problems to consider. We believe the best solution is offered by tank-mounted diaphragm valves like these," reports Everett Badger, shown at the right. He is Chief Engineer of the Fuel Division at Parker Aircraft Co.

"You can save weight," Badger adds, "because the lower pressure drop of tank-mounted valves allows you to use about 25 per cent smaller line sizes. These pressure drops of about 6 psi at 200 gpm is roughly one-half the loss through a similar valve mounted in the fuel line (including exit losses where fuel enters the tank). These savings let you use smaller, lighter lines without reducing the rate of flow to the tank. In addition, tank-mounted valves weigh about 40 per cent less."

"In the nearly ten years since Parker first started making diaphragm valves, we've never had one require service."

"As for continuous maintenance, there are simply no close fits as this valve or the pilot valve where continuous sight pins."

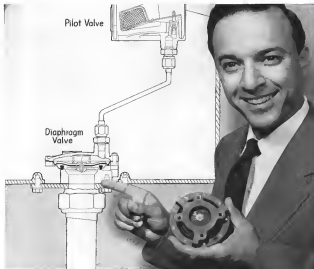
"The same basic diaphragm valve can easily include a second operating diaphragm one to perform various functions such as flow proportioning or secondary fuel shutoff protection. Pilot line ports can be located on either the sub-orbit side or on top of the valve."

"Parker's pilot valves, like the one shown at the right, are available in single or dual styles with many senders. Because these valves are essentially pressure closed, there's no chance for 'hang-up' or faulty operation."

"A brand-new Parker booklet, 'Design Hints for Aircraft Fueling Systems', is just off the press. Send for your copy today."

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Part of New York Ambulance can travel twice the distance and engineering personnel from two hours on the ground to 20 minutes with a 3-place Bell helicopter; a New Jersey utility company developed a helicopter shuttle run between widely scattered substations, and an East Coast insurance uses a helicopter exclusively for business trips in a radius of 100 miles of its headquarters.

In low initial investment, simplified maintenance and economical operating cost—plus built-in safety and efficiency—makes the Bell helicopter a practical form of transportation for the busy executive.

The Bell Model 47 helicopter has been thoroughly proven by more than a million hours of operation in the United States and 10 foreign countries. It is a product of the world's largest manufacturer of commercial helicopters—Bell Aircraft.

Write for complete details.



level assembly are performed, and roller-mounted to the end of this unit, where they are moved by overhead monorail to pre-bake assembly. At this point, the bare major components—cylinder head, power, and case sections—are placed in final-and-test rigs for cleaning and a performance check under simulated conditions.

Pre-bake assembly covers areas station where subassemblies are built into the bare engine, including external parts. Assembly is by fixtures and special tooling, with work performed for easy operation.

Line Job—Racing is now to line assembly where each engine, mounted on a vertical stand over a powered track conveyor, moves according to schedule past a series of stations. All external parts, except for the exhaustor, are installed here, where air jet and distribution timing.

After passing through line assembly, each engine is weighed, then advanced to engine jet-off where it is rigid for something of running conditions—actually a check on assembly accuracy.

To put the engine in flight position at this check station, the supporting fixture is swung through 90 deg. hydraulically from the vertical to horizontal position—Irving Stone

PRODUCTION BRIEFING

► Sheffield Corp., Dayton, Ohio, has become an applicant with General Corp., Long Island City, N. Y., to design, make and distribute the latter's machine tools in the U. S. and Canada, with both firms jointly handling world-wide distribution. General will continue to make aluminum toolholders and generators.

► East Tool Mfg. Co. has opened a new plant in Franklin Park, near Chicago, Ill., to handle increased output of its machine tools and dies.

► A. A. Metal Products, Inc. has completed a \$2,000,000 plant in Gardena, Calif., which will allow increased production of aircraft parts including pilot seat parts and F4U Mustang barrel wings.

► Calumet Bush Co., Detroit, Mich., is adding 6,000 sq. ft. of floor space to its present plant.

► Lockheed Aircraft Service-International, N. Y., International Airport (JFK), totaled \$13,177 production airplanes during the first nine months of this year, a 41% increase over the same period in 1952. Deliveries in the current three-quarter period included 781 aircraft, 23% more than last year.



Boeing 707-320D is used extensively in such advanced production plants as the new North American F-100 Super Sabre and the lightweight Boeing B-57 Insurgent.



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New aircraft designs and fighter concepts are demanding jet engines having greatly increased thrust with less weight—typified by the Westinghouse powered Convair XF1Y-1 "Sea Dart". This jet seaplane—as all other Westinghouse powered aircraft—takes advantage of the lightest weight engine in its power class to attain high speed, high altitude performance.

Westinghouse first met this challenge over ten years ago with the original axial-flow jet engine. Since then, continued engine thrust increases, coupled with a weight reduction program, have resulted in ever-increasing thrust-to-weight ratios. Research has also led to improved durability, reliability and performance with such engineering developments as . . . first application of titanium and its alloys, fabrication of components to replace solid castings and development of the step wall liner.

This pioneering by Westinghouse is paying off in more advanced, high-performance aircraft by making it possible for engines to meet designers' demands for maximum thrust-to-weight ratios. Thus, Westinghouse Aviation Gas Turbine Division contributes to continued pace setting by American aircraft. Westinghouse Electric Corporation, Lester Branch P. O., Philadelphia 13, Penna. 19389



The Convair XF1Y-1 "Sea Dart", experimental U. S. Navy jet seaplane, is one of the latest in a long line of Westinghouse powered, high-performance fighters. It is the world's first delta wing seaplane and the first known combat craft to use hydro skis.

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HEAT-SHIELDING ANM keeps subminiature tube cooler. Spring fingers (right photo) provide support and conductive path for heat.

New Shield Gets Rid of Tube Heat Fast

Device may lengthen subminiature tube life, improve reliability; Wright Field tests show cooling effect.

By Philip Kline

A new type of shield for subminiature tubes, designed to dissipate tube power and heat instead of trapping it, is slated to become standard for future Air Force equipment. The new shield, developed by International Electronic Research Corp., should ease a major cause of tube failure—excessive temperature—thereby improving equipment reliability.

■ **Will Improve Reliability.**—Wright Air Development Center's Electronic Components lab, after testing the new shield, reported that it "will provide better cooling and greater reliability for electron tubes than any other shield or mounting provision for miniature tubes presently being used in military electronic equipment." The report concludes: "It is shield useful to greater reliability for military airborne electronic equipment."

WADC tests showed that a tube enclosed by one of the new IERC shields had a maximum tube temperature rise rate one-third as great as a tube equipped with a standard JAN shield, and only half as great as a tube equipped without any shield. The IERC shield is also designed to restrain conduction-type vibration of the tube relative to its socket.

North American Avionics's avionics division has recently adopted the new shield for all future equipments and several major equipment manufacturers are currently evaluating the shield or have placed pilot orders.

■ **An Airborne Problem.**—The use of tube shields to provide electronic shielding and that to prevent stray coupling between circuits, is almost as old as electron tubes themselves. Until recently, these had been little change in basic tube shield design.

As long as the shield performed its chemical function, nobody worried over the fact that it retarded conduction, convection, and radiation cooling of tubes. The ambient temperatures in which home and industrial electronic equipment usually operate are comparatively low and the equipments can be spaced out 18 and high power dissipation densities.

Since the end of World War II, heat dissipation in aviation equipment has become a major problem. Avionics equipments must be compact, prove high power densities. They must operate in high ambient temperatures and at high altitudes, where cooling isn't as dense, and thus its effectiveness, is greatly reduced.

Numerous solutions have been attempted by avionics equipment manu-

facturers, but mostly on a makeshift, piecemeal basis.

- Tube shields have been painted black, to make them better radiators.
- Some have cut small windows in tube shields to improve convection cooling.
- Combination tube shields and clamps for subminiature tubes have been designed to conduct tube heat to the chassis.

■ **New Design.**—IERC has come up with a totally new miniature tube shield design which occupies no more space than a JAN shield and cools by:

- Convection, through the use of slots along the side and an open top which creates a chimney effect.
- Conduction, through metal fingers which contact the tube envelope and provide a heat path through the shield base to the chassis.
- Radiation, by means of a dull black finish.

■ **Proof by Tests.**—In its tests on the new shield, WADC's Electronic Components lab ran a comparison with other types of miniature tube shields, including standard and modified JAN shields. Five 500 beam power tubes were placed side-by-side on a chassis and operated at rated filament voltage, 240 v, on the plate, drawing a plate current of 475 ma. These thermocouples were attached to each tube glass envelope, one each opposite the top, middle, and bottom of the tube's plate, to measure bulb temperatures.

Each of the five tubes was outfitted with a different type of shielding as-



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SPECIFICATIONS	
Current Rating	15 amps
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Current Carrying Voltage	over 2000V (RMS) 60 cps
Air Pressure Test	15 pounds/in. sq.
Vibration Test	7 g rms
Surge Test	10 inch down applied to control conductor
Insulation Resistance	over 10,000,000 ohms
Ambient Operating Temperature	100°C
Short Time or Intermittent Operating Temperature	200°C

*Trademark of W. R. Grace Company

Illustrated Models: • Types B, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, AA, AB, AC, AD, AE, AF, AG, AH, AI, AJ, AK, AL, AM, AN, AO, AP, AQ, AR, AS, AT, AU, AV, AW, AX, AY, AZ, BA, BB, BC, BD, BE, BF, BG, BH, BI, BJ, BK, BL, BM, BN, BO, BP, BQ, BR, BS, BT, BU, BV, BW, BX, BY, BZ, CA, CB, CC, CD, CE, CF, CG, CH, CI, CJ, CK, CL, CM, CN, CO, CP, CQ, CR, CS, CT, CU, CV, CW, CX, CY, CZ, DA, DB, DC, DD, DE, DF, DG, DH, DI, DJ, DK, DL, DM, DN, DO, DP, DQ, DR, DS, DT, DU, DV, DW, DX, DY, DZ, EA, EB, EC, ED, EE, EF, EG, EH, EI, EJ, EK, EL, EM, EN, EO, EP, EQ, ER, ES, ET, EU, EV, EW, EX, EY, EZ, FA, FB, FC, FD, FE, FF, FG, FH, FI, FJ, FK, FL, FM, FN, FO, FP, FQ, FR, FS, FT, FU, FV, FW, FX, FY, FZ, GA, GB, GC, GD, GE, GF, GG, GH, GI, GJ, GK, GL, GM, GN, GO, GP, GQ, GR, GS, GT, GU, GV, GW, GX, GY, GZ, HA, HB, HC, HD, HE, HF, HG, HH, HI, HJ, HK, HL, HM, HN, HO, HP, HQ, HR, HS, HT, HU, HV, HW, HX, HY, HZ, IA, IB, IC, ID, IE, IF, IG, IH, II, IJ, IK, IL, IM, IN, IO, IP, IQ, IR, IS, IT, IU, IV, IW, IX, IY, IZ, JA, JB, JC, JD, JE, JF, JG, JH, JI, JJ, JK, JL, JM, JN, JO, JP, JQ, JR, JS, JT, JU, JV, JW, JX, JY, JZ, KA, KB, KC, KD, KE, KF, KG, KH, KI, KJ, KK, KL, KM, KN, KO, KP, KQ, KR, KS, KT, KU, KV, KW, KX, KY, KZ, LA, LB, LC, LD, LE, LF, LG, LH, LI, LJ, LK, LL, LM, LN, LO, LP, LQ, LR, LS, LT, LU, LV, LW, LX, LY, LZ, MA, MB, MC, MD, ME, MF, MG, MH, MI, MJ, MK, ML, MM, MN, MO, MP, MQ, MR, MS, MT, MU, MV, MW, MX, MY, MZ, NA, NB, NC, ND, NE, NF, NG, NH, NI, NJ, NK, NL, NM, NN, NO, NP, NQ, NR, NS, NT, NU, NV, NW, NX, NY, NZ, OA, OB, OC, OD, OE, OF, OG, OH, OI, OJ, OK, OL, OM, ON, OO, OP, OQ, OR, OS, OT, OU, OV, OW, OX, OY, OZ, PA, PB, PC, PD, PE, PF, PG, PH, PI, PJ, PK, PL, PM, PN, PO, PP, PQ, PR, PS, PT, PU, PV, PW, PX, PY, PZ, QA, QB, QC, QD, QE, QF, QG, QH, QI, QJ, QK, QL, QM, QN, QO, QP, QQ, QR, QS, QT, QU, QV, QW, QX, QY, QZ, RA, RB, RC, RD, RE, RF, RG, RH, RI, RJ, RK, RL, RM, RN, RO, RP, RQ, RR, RS, RT, RU, RV, RW, RX, RY, RZ, SA, SB, SC, SD, SE, SF, SG, SH, SI, SJ, SK, SL, SM, SN, SO, SP, SQ, SR, SS, ST, SU, SV, SW, SX, SY, SZ, TA, TB, TC, TD, TE, TF, TG, TH, TI, TJ, TK, TL, TM, TN, TO, TP, TQ, TR, TS, TT, TU, TV, TW, TX, TY, TZ, UA, UB, UC, UD, UE, UF, UG, UH, UI, UJ, UK, UL, UM, UN, UO, UP, UQ, UR, US, UT, UY, UZ, VA, VB, VC, VD, VE, VF, VG, VH, VI, VJ, VK, VL, VM, VN, VO, VP, VQ, VR, VS, VT, VU, VV, VW, VX, VY, VZ, WA, WB, WC, WD, WE, WF, WG, WH, WI, WJ, WK, WL, WM, WN, WO, WP, WQ, WR, WS, WT, WY, WZ, XA, XB, XC, XD, XE, XF, XG, XH, XI, XJ, XK, XL, XM, XN, XO, XP, XQ, XR, XS, XT, XU, XV, XW, XX, XY, XZ, YA, YB, YC, YD, YE, YF, YG, YH, YI, YJ, YK, YL, YM, YN, YO, YP, YQ, YR, YS, YT, YU, YV, YW, YX, YZ, ZA, ZB, ZC, ZD, ZE, ZF, ZG, ZH, ZI, ZJ, ZK, ZL, ZM, ZN, ZO, ZP, ZQ, ZR, ZS, ZT, ZU, ZV, ZW, ZX, ZY, ZZ.

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to which it is attached to the chassis, provided a better heat conduction path. Despite the expanded construction, the new shields are no more mounted in their JAN counterparts, for reason to the tube.

The spring fingers serve another function—to provide support for the tube and prevent mechanical stresses of the tube under vibration conditions. IERC says that no definite mechanical stresses are experienced in the radio-frequency spectrum for the tube and shield construction.

Availability—Production quantities of the new tube shields, for various sizes of screen and wire-pin quantities tubes

are now available, according to Harvey Rigg, IERC president. Because the new shield base will fit chassis designed for JAN shields, Rigg reports that several companies are considering changing out existing equipment to use the new IERC shield.

International Electronic Research Corp., which was formed a year ago, also makes a line of semiconductor tubes specially designed for cooling. The company is an affiliate of General Engineering Co. of Cleveland, Ohio. IERC's chief engineer, Leroy Woods, was responsible for the new development.

Company address is 175 West Magnolia Blvd., Burbank, Calif.



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Saab-91 Sailer now a four-seater

The well-known Saab-91 Sailer 3-seat aircraft training and touring aircraft is now available in a new and comfortable 4-seat model—the Saab-91C. Especially designed for accurate and pleasure travel as well as for fun and leader use, the new Sailer is also equally suitable as

a light utility or emergency transport. Its remaining rear seats, a quarter-ton cargo can be easily carried. Like its predecessor, the 91A and the improved 91B Sailer versions now in use with several major and government flying training schools, the 91C Sailer can also be used as a primary trainer up to the more advanced stages of jet training. All this makes the new Sailer one of the world's most versatile light aircraft.



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SAAB

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is too low, acceptable, or too high. Its operation limits can be set at any value from value: 0.5% below and 0.400% nominal value. Model C87 impedance lead bridge is manufactured by Galton Electrical Co., Milwaukee, W. I.

• **Impedance bridge** can be used to measure resistance of 0.10 megohms with a possible error of less than 0.1% and capacitance in p.f.s., as one intended with a possible error of under 0.2%. The M3 impedance bridge manufactured by Goodhue-Avenell Corp., com-

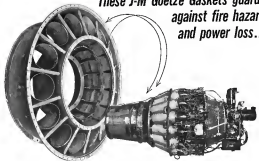


plete lineups of Wheatstone and Schering bridges. To measure an unknown resistance or capacitance, operator relays controls until indicator indicates a constant, then reads control knob indication. The device operates from 100 v. a.c. Goodhue's address: Akron, Ohio.

Radar Designers Get New Components

New components for use in microwave radar vol. announced recently include a K-band klystron tube, a microwave attenuator pad, pulse-forming

These J-M Goetze Gaskets guard against fire hazard and power loss...



Arrows point to J-M Goetze metallic gaskets on the inner and outer rotors, and show approved installation on the J33 jet engine at Pratt & Whitney.

...on powerful turbojet engines like the J33

Sealing the inner and outer rotors on the J33 to prevent leakage of fuel and flame inside turbine is another example of the many tough, critical sealing jobs encountered in Goetze custom-crafted metallic gaskets.

For this particular service condition, the Goetze gasket specified is made from a flat gasket design... with the metal on both edges rolled around an asbestos filler. This construction provides the resistance needed to overcome the weight encountered in these applications. Like all Goetze gaskets, this style is precision-made to fit right and stay right in service.

There is a Johns-Manville Goetze gasket for practically every jet en-

gine requirement. Goetze engineers can fabricate them in almost any shape or size for welding systems, compressor blades, steam turbine tubes, combustion chambers, fuel nozzles, turbine discs, liners, etc. Backed by more than 40 years of Goetze "know-how," these durable gaskets are solving many of industry's most complex sealing problems.

Write us now for further information about Johns-Manville Goetze gaskets... and other J-M high-powered products for the aviation industry. Ask for your copy of Brochure AV-1A. Address: Johns-Manville, Box 60, New York 16, N. Y. In Canada, 159 Bay Street, Toronto 1, Canada.



Close-up of J-M Goetze metallic gaskets used as inner and outer rotor gaskets on jet engine turbine frame.



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... IT'S Enduro!



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This ENDURO Stainless Steel expansion joint—thrusts feet in diameter—is part of an aircraft laboratory wind tunnel.

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Here's another application in which Republic ENDURO Stainless Steel demonstrates its great strength, toughness, resistance to heat and to corrosion ... and its fabricating possibilities. Where can you ever see these qualities? Republic steelhangers are ready to help you apply ENDURO to all types of aircraft developments. Just write:

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 Alloy Steel Division • Massillon, Ohio
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 Bureau Department • Cleveland 16, Ohio

Exhibits Republic's ENDURO Stainless Steel in manufacturing engine parts of all sizes. Under the Exhilara process, there are no circumferential welds in the corrugated section subject to flexing stresses.

Republic
ENDURO STAINLESS STEEL

Other Republic Products include Carbon and Alloy Steels—Tees, Flanges, Tubes, Headers, Shells, and Industrial Steel Building Products

networks, and quartz delay lines. The details:

- **K-band klystrons** can be thermally tuned over the frequency range of 13,500 mc. to 24,000 mc. at 1.2 to 2.6 seconds. Maximum power output of the new RAN 1850 klystron is 3.5 mw. Tuning is accomplished by varying the grid bias voltage of a triode section incorporated in the klystron's output coupling. Resizing maintains a brook plate current source thermal expansion and contraction of the triode plate, attached to the klystron's output, thereby changing its gap spacing. Manufacturer is Bendix Aviation Corp., Red Bank, Del., Easton, Pa. 1

- **Massachusetts** will employ piezoelectric film transducer modules. It is reportedly capable of withstanding overloads of more than 100%. Manufacturer is Tektronix Laboratories, Inc., 108 Metropolitan Ave., Boston 11, Mass.

- **Pulse-counting networks** are available in two new types for laboratory and hydrogen thermostat tube testing. Model H-500 provides choice of five pulse lengths, 4, 4.1, 2, and 5 microseconds, with no distortion of the pulse shape, manufacturer says. Designed for operation with a 50-ohm impedance load, network is rated for peak voltage of 15 kv. New units of five networks, H-551 to H-555, is designed for testing different types of theorems. Manufacturer is Spangco Electric Co., 151 Marshall St., North Adams, Mass.

- **Delay lines of broad quartz base** delay 1 to 5,000 microseconds at operating frequencies of 5 to 100 mc. Operating voltage is up to 50 db below desired signal, repeats the radiologist. Supplier is The Liberman Fox Electronics, Inc., 75 4 Park St., Boston 18, Mass.

Gyro Combination for Unlimited Maneuvers

Sweeney Gyroscopic Co. has combined a rate gyroscopic and a small integrating motor to obtain the perfect equivalent of a combination rate and



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 Ask for Mr. Jones, 1000 100th Avenue, Boston, Mass.

displacement gyno for static runs. The new 3-1/2" Model 97 Rotar Integrating Detector, as the device is called, is currently in production for use in a Samsont lightplane outboard and a number of standard engine control systems. One advantage of the device, compared to a displacement gyno, is that it is non-tumbling, permitting use in limited airplane installations.

The new device runs the Samsont Model 120 integrating motor whose low rotor inertia design gives it a speed proportional to applied voltage over its operating range. The computer says: "When the signal voltage from the rotor gives you pick-off (proportional to airplane

or engine angular velocity) it is applied to the integrating motor, its rotor moves through an angle proportional to the integral of the rate gyno signal. Thus the accelerometer rotor returns angle is accurately proportional to the plane or engine's angular displacement."

The integrating motor device is a precision metal potentiometer (through a suitable gyno reduction) to provide a source of displacement signal.

The Model 97 is supplied in a case whose dimensions are 10x5x4 in. The rate gyno motor can be supplied in 10 or 150 rpm sizes, 100 or 400 or 800 cps. Air Company address is: 2535 Broadway, New York, N.Y.

FILTER CENTER SERIES

▲ **Atlas Reynolds Synthetic Materials**—Aerobloc's E. Reilly, Inc., has introduced earlier editions of its Synthetic Surface Manual (which it calls "The Bible of an up-to-date synthetic maintenance") and will shortly print a new edition. Orders received prior to printing (Jan. 3, 1954) for quantities of 50 or more will be filled for \$1.00 each. After that date, the price will be \$1.50 each. Write address: 1525 L Street N.W., Washington 5, D. C.

▲ **Link-Master**—Link-Master, Inc., for its aircraft simulation and training, has completed USAF-sponsored work on guided missile training aids and facilities for training operators of different types of missiles. Link-Master has completed work on missile training aid and has several other under development.

▲ **IBM Computer for Jet Problems**—General Electric has installed a new International Business Machines Corp. Model 704 electronic computer at its Aircraft Gas Turbine Development Lab in Elizabeth, Ohio, to speed calculations on jet engine problems. Computer has magnetic drum, tape and electronic storage provisions. —PK

TECHNICAL NEWS



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APPLYING SILASTIC TO VALVE STEM



FIG. 1. SEALING AND STRENGTH

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AP2 MASTER VALVE



Check valves. Use for landing gear, wheel brakes, retractable other uses.



AP3 REDUCING VALVE



Westinghouse Air Brake Company

Wheeling, W. Va.

AIRCRAFT SECTION

INDUSTRIAL PRODUCTS DIVISION

as a resilient
pressure seal for truck
and bus tire valves...

SILASTIC works where other materials fail!

High speeds, heavy loads and sustained operation make truck and bus tire valves a real problem. Temperatures on the rim and in the valve stem can shoot as high as 350°F. Organic rubber gaskets within the valve can rapidly lose their original resilience, become sticky, and fail to maintain proper air pressure.

The Dill Manufacturing Co. of Cleveland eliminates the problem by using Silastic® gasket materials in disk valve stems. The gaskets remain resilient, maintain an airtight but easily opened and closed high-temperature seal in sub-zero weather. Dill has made over 2 million valve stems with Silastic gaskets since 1948, and the first failure traceable to deterioration of the Silastic seal has yet to be reported.

Further proof of the usefulness of Silastic as a gasket and sealing material is given in Figure 1. Samples of Silastic and a high quality organic rubber were compressed for 22 hours at temperatures ranging from -60° to 400°F. They were then released and measured after 30 minutes at room temperature or at test temperatures where samples were compressed of temperatures below 77°F. Values plotted in Figure 1 show that Silastic retains its resiliency at temperatures far above and below the limits of organic rubbers.

If you need a rubbery material that retains its physical and elastic properties, resists water, oil, and acids, and is non-toxic to most sticky materials even after long exposure to weather, contact with a variety of hot oils and chemicals, or service at temperatures from below -100° to above 500°F, TRY SILASTIC.

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Dept. 5, 12800 Shaker Boulevard Cleveland 20, Ohio

frequency coincide with the natural frequency of a component in the system rigidly attached to the support, a dangerous multiplication of stresses occurs, which increases the likelihood of failure in the component.

The use of mounts almost completely eliminates the effect of these stresses, however, excessive components in complex systems and their supports, by creating a condition in which the natural frequency of the support bracket becomes insignificant. The second frequency of the mountings becomes the only natural frequency to consider, and this is a known value as can readily be determined. Care in the selection of components or mounting can be exercised to see that these natural frequencies do not coincide. The advantage of having only one critical frequency is reduced with double frequency.

With regard to Mr. Pratt's comments on the brackets connected with the use of shock mounts which double duty bottoming shock absorbers this is merely evidence of an improper shock mount application. It is usually the use of a vibration isolator in place of a shock isolator. Sometimes, such isolators inadvertently act as vibration isolators where shock protection is desired. Shock absorbers of the type used in aircraft are generally low natural frequency devices and are unsuitable for handling major shocks. This is largely due to specifications imposed by the military. Shock absorbers for normal operation applications, on the other hand, generally have a higher natural frequency and naturally some gradual cushioning than possible in a vibration isolator. Shock isolators with gradual cushioning characteristics have been used successfully under the most shock conditions experienced by naval combat vessels for years.

MARSHALL CROFT, Section Engineer
The Navy Corp.
700 Pleasant St.

WASHINGTON, D. C.
Only answer to Mr. Gerd's would be one of clarifying my statement. My statement was based upon the fact that such riding amplitude of vibration existed in such frequency that shock or vibration mounts in any specific problem could have been installed and would serve shock that we felt would be the most severe than the vibration would be if a component or package were hand mounted. This thinking is not one that should be used indiscriminately by other machine manufacturers, and there are very truly many specific problems where shock and vibration mounts will not in design require excessive frequencies. Therefore, my only defense in this statement is, of course, that we had a specific problem in which we would rather accept the vibration from the surface rather than risk the shock — P. A. (P.A.)

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Klaxon Circuit Breakers withstand shock and vibration for as much as the values normally required. All tested types and values are explosion-proof, corrosion and humidity resistant.

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KLIXON

To help keep the equipment in use.
When the principal shareholders of Nippon Airways, Ltd., decided to discontinue manufacturing and service at the end of 1945, the main objective in forming the Nippon Airways Co. in Canada was to place it in the hands of an interested company, in the transportation field, which appeared to be able and willing to continue to serve the operators in Canada and elsewhere (there were no would-be Nipponians).
I have recently — with some of my friends in Montreal, bought back for which Nipponians prosper, from Canadian Gas & Power Co.

Included in this transfer is the subsidiary company, Nippon Airways Montreal, Ltd., which holds the rights in the Nippon Airways, name, and trademark the drawings, rig and tools, installed accessories, contracts on hand and past (backed and unbacked), but not including those which Gas Co. recently had in process against first purchase order, in May 22, 1955.

Mr. members in the deal are Arthur Lefebvre and Joseph Zimato, both formerly for some years with Nippon Airways, Ltd. There were also some for me built up a successful and well-placed business in the sale of parts, under the name of Aircraft Parts and Supplies Ref'd, in Montreal.

My own function in Nippon Airways Montreal, Ltd., will be mostly of a consulting nature, but I do want to impress on you, (and it is the purpose of this letter to impress you) that everything will be done to see that all Nipponians operators are provided with prompt, professional and expert service at all points. We do not want any Nipponians operators ever to feel that he has an "orphan" airline on his hands.

Arrangements are made to have any parts or accessories obtainable, ready for old-time Nipponian operators, who know their business and have the proper facilities available, which is essential at a reasonable cost. Please write, always be as low as possible, consistent with quality.

For the repair and overhaul of airplane engines in Montreal, we cannot do anything but to install facilities, to make arrangements with existing establishments who are engaged to perform such work in the country's jurisdiction.

Such arrangements will be in the nature of "advisory services," for which we will be prepared to furnish engineering information, as far as may be required, and paid to and when such arrangements are completed, you will be advised of them, at least where they are likely to be of specific interest to you, as to location.

We are putting up a sizable building, close to Canada's airport.

In the meantime, any inquiries, or orders, such which you may have in will receive prompt attention.

It would also be useful, and appreciated if we were told the models and serial numbers of any Nipponians you require now, or have in use, in that we can compile and maintain a record of all these still in operation.

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EQUIPMENT



HSP 1040 STAND checks hydraulic components and with Turbo-Hydraulic poppettes.

Turboprop Test Stands Developed

By George L. Christman

Hartford, Conn.—The growing interest of commercial airlines in turboprop power for aircraft has focused attention on the need for equipment capable of testing poppet control components of this new type of powerplant.

Kahn and Co., a small but active organization in the city, has developed a line of turboprop poppet test stands with Hamilton Standard Division of United Aircraft Corp., which makes the 540-hp T54 engine's poppet. This equipment can run tests of all complete hydraulic and electric assemblies in the prop pitch control system and

all components of these assemblies. Units are already at work on the floor at Han Standard's large, modern plant in nearby Windsor Locks.

► Turboprop Two-Two, the first includes HSP Model 2040 hydraulic component test stand, HSP Model 2047 electronic governor test stand, and HSP Model 2048 electronic synchronous test stand.

In addition to these three units Kahn manufactures a large variety of test equipment for air-cools, fuel regulators, thermocouples, fuel pumps, gyro compass, afterburner controls and fuel regulators.

Other Kahn products are engine rpm control switches, aircraft poppet blade



FROM BLADE PROTRACTOR measures poppet blade subassembly at test stations.

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Not Buck Rogers space ships, ready for take off, but tough, noise-killing Maxim Silencers at the Wright Aeronautical Division of Curtiss-Wright.

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Here's another example of Maxim's contribution today to the aircraft field. For more information, write to: THE MAXIM SILENCER COMPANY, 1001 Homestead Avenue, Hartford 1, Connecticut

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Whether you're racing with sound up in the stratosphere or making a final approach to a landing strip at sea-level, it's reassuring to know that you have the most efficient, most reliable controls built. It is for this reason that the operators on so many of the newest, high-flying military jet fighters and bombers incorporate Saginaw Ball Bearing Screws.



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Developed by Saginaw Steering Gear Division of General Motors Corporation, Saginaw Screws can be supplied in any size to a complete range of load and life requirements. They can be combined with electrical, hydraulic or pneumatic units to insure greater safety and more efficient operation of any number of aircraft parts. It will pay you to consult our engineers about your requirements. Write today for engineering data book.

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for Bulletin DW-602

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measuring equipment, guided inside pressure test stand, recording motor units, motor amplifiers, silicon coils, guided inside pressure stands, safety lenses and other laboratory accessories.

► Built for the Future—Kahn, president and J. Kahn, vice president engineering, see that among the highlights of the equipment they call for (Hans Smeets?) Turbo-Hydrostatic reciprocating pressure and velocity are their flexibility, versatility and wide range. The units were designed in conjunction with Hans Standard and made by Kahn.

The stands will accommodate any foreseeable changes in the costs and components now being tested, Kahn says.

► **HSP 1040**—The hydrostatic component test stand can check every unit from inert capacity and pressure to the highest, used in the entire range of H. Smeets' Turbo-Hydrostatic pumps. Adapters have to be used in some cases.

The stand features two independent, variable-speed drives: one delivers 15 hp, the other 15 hp. Speed range is 0.5-2200 rpm.

Two pressure systems are included. The high-pressure system that can test units up to 4000 psi uses standard and built-in low-pressure units of 800 psi units (upper limit in the test stand pressure range) have an accuracy of 1 of 15.

Provisions within the machine have been made to test in oil the oil and liquids are 150° down to ambient (10-60°). All oil used in the machine is passed through high-capacity filters. Reducible power allows the stand to check d.c. actuated opened hydraulic valves.

Machine is equipped with high-pressure flowmeters (Kahn has the 1000-psi. Parker flowmeter is "a very good and accurate instrument"). Flow rate meters, strain gauges and temperature meters. The latter are to measure and measure torque required.

Transparent plastic load-out units being tested systems provided from being opened during operation of the machine.

Interior of the cabinet is painted white to make all components stand out better and in highlights made as much as possible to simplify servicing.

► **Any Component—Kahn** specifies say the test stand can "test any existing accurate hydraulic component for either pressure, flow or both under the test stand the power output of the stand." It can test any hydraulic component on a Hydrostatic or Turbo-Hydrostatic Hamilton Standard property.

These components include: piston motors, distributor valves, main, gear-pumps and straight pumps, high and



AEROPRODUCTS ACTUATORS CONTROL "FLYABLE TAIL"

Self-locking features aid Republic's new F84F



Typical Aeroproducts Actuator

The broad adaptability of Aeroproducts actuators has helped to solve problems encountered in the design of the "flyable tail" of the new Republic F84F jet fighter. The application of these actuators permits continuous adjustment of a variable surface to any position within its design range. The self-locking feature of Aeroproducts actuators assures the adjustment until it is changed by the pilot.

Any combination of systems—hydraulic, pneumatic, electric or manual—can serve as the primary power source for Aeroproducts actuators. They can be synchronized readily in motion or in static to provide coordinated control of related movements.

Assured use of Aeroproducts actuators include those for the control of the "flyable tail" of the Republic F84F, the horizontal stabilizer on another high-speed jet fighter and the afterburner nozzle in a jet engine. Additional applications include control of wing flaps, door brakes, bomb bay or cargo doors, gun turret, variable wing sweep and incidence, wing fold and canopy slides.

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Designing for tomorrow



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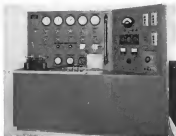
mounts, and other applications. Major reasons for its industry-wide preference are its uniform high quality, strength-without-weight, ease of machining, and exactness in forming and fabricating.

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OHIO SEAMLESS TUBE DIVISION
of Corrosion Steel Company

Research and Technology of Materials and Metals, United States Patent
Office, and General Electric, GEORGIA, U.S.A.

[illegible]

HALF 2005 CLOVERWORKS Inc. stand will check all such Hamilton Standard units.

low-pressure relief valves, backup pressure relief valves, pump relief valves, pressure regulating valves, solenoid valves and feathering motors.

• **HDP 3247**—The electronic governor test stand for TurboHydramatic poppetless checks the whole governor, and every component of the governor.

Features of the machine include 400-cycle, 115-v power supply and 100-cycle, variable voltage (0-300 v) with precision frequency regulation to within .001%—both are temperature

Some of the components which the machine is built to test are amplifiers, ported power supplies, load and input frequency pots, frequency ranging pots and variable caps.

► **115P 3043**—The electronic synthesizer test stand features the same drive speed accuracies of 4 of 1% as the 115P 3047. Drive speeds range from 0 to 3,330 rpm.

Machine incorporates a timing generator and several power supplies, such as a 400-cycle a.c. and d.c. supply at different levels.

This stand is also built to test the complete assembly and all of the source lab's components. Among those that it can test are power supply, methanol burner pot, filament transformer pot,

Standard Governor Stand-Kahn also manufactures a stand which will test any governor made by Ham Standard. This is the HSP 1005.

The machine also means to duplicate whatever direct action is involved

blade pitch change, it automatically compensates for variations in engine rpm, and it automatically compensates for propeller blades' tendency to go to low pitch—it works harder moving blades into high pitch.

Standard supplies high-flow, long-purse hydraulic force and is equipped with complete electronic controls for the operator's electric control board.

► **Electrical Avionics Stand-This** machine, the HSP 1952, was originally conceived to test HS propeller electrical avionics. Actually, when completed, a potent capsule of testing these other aircraft components in well-defined tractor, auxiliary pump, tractor blade heater, tachometer generator, differential motor, current limiter, and a variety of access and switches

HSF 1912 can handle electrical acoustics for most commercial needs built by Boeing, Coors, Douglas, Lockheed and Martin, Kuhn says. It can be used for Hans Standard electrical equipment on U. S. military vessels and on the Swedish Sah 70, the French S.O. 332 and the German T-15.

This stand includes a post-mounted ophthalmoscope, multi-channel strip recorder, variable power source, variable-speed drive and tachometer, precision dial, universal precision sawtooth

► **Other Test Stands**—Among other test stands manufactured by Kales are:



Cargo Watch was of 25 foam burlap bags, five breakers and work clothes manufactured by EEP Inc. Giametti's "Admiral" Service Ship and Cargo Jet.

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NEW AVIATION PRODUCTS



Photoelectric Control for Airport Lighting Circuits

A simplified photoelectric control device for timing airport lights as well as offered by General Electric.

Each model a dip-soldered sealed circuit, the unit permits easy installation and provides trouble-free lighting protection, GE engineers state.

Types P-2 and P-2A handle high-level illumination for airports, while low-level illumination is provided with types P-1 and P-1A. Plug-in elements are interchangeable with all types previously supplied and with those used in GE form 110 street lighting units. P-1 unit converts to P-2 by addition of photoelectric shield.

Unit adjusts to operate under any conditions at light level from 1 to 8 or 10 to 60 ft. candles at the photoelectric shield permits maximum light from sky to strike photoelectric while minimizing effect of stray light from nearby sources.

High amplification of the two amplifiers when provides greater sensitivity at lower light levels, GE says. Estimated life of the photoelectric is 10,000 hr., while that of amplifier tubes is 10,000 to 20,000 hr.

GE engineers feel that photoelectric control is the answer to problems involved in timing on lights as soon as they are needed, over photo cell "mass-action" amount of light in sky. Use of the unit eliminates expensive installation and maintenance of pilot wires, time clocks and overlapping circuits.

General Electric Co., Lighting & Controls Dept., Schenectady 5, N. Y.

Pilot Headset Eases Ear Pressure, Chafing

Removes all new type of earphone sets, known as the Telex-Tenax, set on triangles, eliminating chafing, pressure and uncomfortable straps associated with earlier types. Sealed in gently ductile into so, though thin, tubular sound are mounted on ball-and-socket



Want to "hang a Watch" in a furnace...and make it run?

Something as technically difficult as being done now. For instance, the "hangers" (peddles) and turbine rotor assemblies we make for aircraft jet engines.

These hangers have to stand up against 20,000 revolutions a minute and a flame 1400° hot. Yet, they are made to closer tolerances than many of the parts in your watch and your automobile.

To accomplish this, the Jet Division developed a special technique to fabricate large, unusual, tougher-than-steel alloys to concrete curves—even smoother than glass...with no final machining required! And we helped develop the alloys.

You're probably planning a new product...or how to make a present one better, stronger, at lower cost. Now is the time to call on the Jet Division for recommendations and technical advice.

We offer you our experience in making more jet-engine "buckets" and turbine cases than any other producer.

JET DIVISION

Thompson Products, Inc.

DEPARTMENT 26-12 • CLEVELAND 17, OHIO



Delta-C&S Air Lines

GENERAL OFFICES: MUNICIPAL AIRPORT ATLANTA, GEORGIA

August 24, 1953

Vickers Incorporated
1462 Oakman Boulevard
Detroit 32, Michigan

Attention: Mr. P. T. Harrington, Vice President

Dear Mr. Harrington:

It was interesting to note that both Delta and C & S while still separate companies had specified Vickers pumps, motors, motorpumps, accumulators, valves etc., for the hydraulic systems of new Convair 340 aircraft. Vickers hydraulic accessories were already in service on the DC-4s and Constellations. This simplified integration of our flight equipment at the time of the merger.

Working separately, Delta and C & S arrived at the same reasons for specifying Vickers Hydraulic Accessories. We wanted accessories which would have outstanding reliability, high overhaul periods, low overhaul costs, interchangeability between aircraft and minimum parts stock requirements. We also wanted the attention of service personnel when necessary, ready parts availability for normal overhaul and repairs plus indications of continuing product improvement. As a merged company (the fifth largest U.S. Airline), we still feel that Vickers and their Hydraulic Accessories meet our requirements.

We thought you would like to know that Vickers accessories have also been specified for our new DC-7 aircraft. We are sure your company will continue to provide the effort and attention necessary to maintain the position you now enjoy with us.

Very truly yours,

DELTA-C&S AIR LINES



C. H. DeLeon
Vice President, Operations



Serving the Heart of America
and Six Caribbean Countries



part. Manufacturer feels that use of jet will reduce pilot fatigue.

Overhead T and connection in access has been replaced by a 5 lb. nozzle, reportedly permitting greater freedom of movement. Unit is constructed of brass and steel. A 2 wheel unit was installed in covered to flexible plastic.

Vertical boosters mounted, replace separate struts. Sensitivity at 100 lb. above 500000 dynes per sq. in. for 50 cps, input.

Manufacturer lists commercial aviation, business and private flyers as good potential markets. Unit is CAA type approved.

Vicks, Inc., Dept. KF, Telen Park, St. Paul, Minn.

Highspeed D.C. Generators For Continuous Duty in Jets

Three new highspeed d.c. generators for jet engines have been developed and will go into production soon, manufacturer Jack & Heintz, Inc. announces.

Designed Models G123, G124 and G125, most are called "true 5,000 rpm, continuous-duty generators" by J&H. The company cites a need for a rpm which can operate continuously at high speeds because of the dynamic stresses of the highspeed accessory pods presently used on jet engines.

12000 pounds per inch pressure can usually be met, compared previously to the corresponding engine, but not less than continuously at 5,000 rpm. Reason given is that best generated within the limits of 5,000 rpm is considerably more than at 4,000 rpm then are to.



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A tricky flexible hose problem for aircraft? You can relieve the pressure by calling in Flex-O-Tube. Our engineers are specialists in the application of flexible hose products and are backed by a great fund of experience in the industry . . . twenty-five years of it.

Tight aircraft production schedules to meet? You can count on delivery schedules from Flex-O-Tube. And the uniform high quality that Flex-O-Tube is famous for is rightly important where every assembly counts.

These two factors, combined with the dependable performance of Flex-O-Tube products, are the very reasons why more and more aircraft engineers and production men are specifying Flex-O-Tube. You'll benefit, too, when you put the pressure on Flex-O-Tube.



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signed for, and mechanical stresses in the square of the speed.

Consideration of high temperatures and high stress reduces service life of such items as bearings, transmissions, bushings and couplings, Jack & Heintz notes.

The feature of the new design is the incorporation of a "straight through" air path, designed to provide maximum cooling of the seal. Removable in open to shut or in free to pass under it and through compressor of mixture. An space through stator is increased through its internal design.

The G121 model is designed to supply 300 amp at 30 v with speed range of 1,000-5,000 rpm. It has a 2 1/2 in. diameter air inlet and requires cooling air at pressure equivalent to 6 in. water. Approximate measurements are 17 1/2 in. length and 6 1/2 in. diameter. Unit weighs 44 lb., has over 1000 in. of cooling surface.

G124 will supply 400 amp at 30 v with a speed range of 1,000-5,000 rpm. Air inlet size and cooling air pressure is same as for G121. Measurements are approximately 11 5/16 in. long and 4 1/2 in. diameter. Generator weighs 51 lb., has over 1000 in. of cooling surface.

G125 will supply 400 amp at 30 v with a speed range of 1,000-5,000 rpm. Cooling air is required at pressure equivalent to 12 in. water. Unit dimensions approximately 14 1/2 in. long and 5 1/2 in. diameter, weighs 65 lb., has over 1000 in. of cooling surface.

Jack & Heintz, Inc., Cleveland 1, Ohio.

Magnetic Setup Blocks Simplify Grinding Work

Complete line of magnetic parallels and V-blocks, as well as other fixtures, has been put on the market by the George Heller Co.

Known by the trade name of Magna-Block, units are manufactured of alternate layers of hard annealing iron and soft laminations of high magnetic capacity material is in. With their dimensions, Magna-Block may be used on all types of magnetic chucks, including permanent magnetic type.

Chief advantage claimed is saving in time and labor by simplification of difficult setups, elimination of complicated holding devices enabling operator to



FIRST commercial tvor to be installed by COLLINS RADIO



COLLINS TVOR equipment similar to the purchased by Santa Monica

The first purchase of TVOR by any city in the U.S. was made recently by Santa Monica, California, for use at Clover Field. The equipment chosen — Collins.

Packaged Terminal Visual Omni Range equipment has been in the experimental stage for some time, but not until Collins Radio developed the equipment purchased by Santa Monica has any TVOR actually been purchased by a municipality for use as its airport.

Collins TVOR is to be installed on Clover Field (location of Douglas Aircraft) early next year. It will be operated by the city. Negotiations were completed through Collins' authorized dealer, the Aeronautics Aviation Service Company.

COLLINS RADIO COMPANY

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T. H. Beck, Manager of Engineering, is an engineering veteran of over 22 years at the company and retired in 1945.



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Aircraft Division BUFFALO, N.Y.

was the first problem. Reconfiguration in the early 1960s with the existing market (and many other scheduled airlines) was too low to consider. Instead, a steadily eroding \$15 million was assigned with a huge pocket of losses. Until 1968, when the interest remains a fraction of 1%, yet the resources stand ready for any contingency.

Seattle-Niagara-Creston, but not necessarily possible. It was not until 1968 that the transfer of NWA's main western and operations base from Minneapolis to the wider climate of Seattle-Denver division in the end of the month.

Manuel's first, Paul already have tapered their high bus into and altered Northwest last. Manual's purchase was the needed expansion of facilities. Seattle also is making a strong bid.

Reactions to the possible transfer are mixed among company officials. Some favor the move but predict that it will not occur.

Present Equipment—Most westhous of Northwest's domestic and Coast fleet still is the World War II-designed Douglas DC-4, with 24 in operation on NWA routes.

Passenger leaders now being replaced on the transcontinental route as Northwest's double-deck Superliner.

The airline also operates eight Douglas DC-5s on its "Mountain service" routes between Twin Cities and Spokane.

All four latest DC-6Bs will be delivered to Portland Chicago and Detroit each service by February. They are scheduled to carry 74 to 78 passengers on domestic routes and 75 on the 37,000-mi run to Hawaii.

Low-Terra Western-Business improved the first one of this year, as shown by the airline's first quarterly revenue dropped lower than usual during the recent season. Sales and traffic officials generally blame the downturn on a drop in Korean reborn, but airlines have not yet been able to find the Seattle market. The 1,100-mile route of the Boeing head of Boeing. Clark also has the Northwest financial showing.

Improved service, increasing sales promotion effectiveness are expected to convert this fiscal year and return it to the relatively strong long-term up trend.

Route Changes—President Hurd says Northwest is not out to build a three-quarter route empire. He says there may come some day.

New York-Chicago. NWA wants CAB to lift all restrictions prohibiting the airline from direct New York-Detroit-Chicago service.

The carrier wants all three cities, but Chicago probably is a year from

the direct New York-Twin Cities from the Chicago route. A major threat to Northwest, however, because of its community of interest with the North Central and Northwestern cities on its route.

Trans-Pacific route growth. Vital Northwest aim in this case is the steady defense out of growing permanent restriction of its direct, Coast-Circle route to the Coast and preventing Pan American from gaining competitive rights on it, if possible. NWA and Trans World Airlines are trying to parallel TAA's Japan-to-India route, but this is a secondary possibility.

Flight service case. Northwest originally was the exclusive Northwest-Hawaii franchise. Pan American had not sought it actively but maintained that if any carrier could get the route, it was the logical choice.

Two weeks after CAB gave it to Northwest, President Truesdale added a competitive right for Pan American on the then daily-travelled route.

Lowest Rates Will Win Airmail, PO Routes

Postmaster General Arthur Summerfield's decision to ship airmail only by the lowest-rate airline on competitive routes after Jan. 1 is expected to force at least three major changes in the pattern and rate structure for airmail. Government and industry officials say these are:

- Immediate rate cuts by high-rate carriers on competitive routes. Civil Aeronautics Board is working on a policy statement and guidelines order to be issued soon.
- Complete revision later of the entire mail-par structure, changing from the present single rate per carrier to the new competitive point-to-point rate system used by CAB and the airlines on passengers and cargo.
- Decision to reduce charges of some scheduled airmail services if CAB and the high-rate airlines try to effect lower airmail rates by higher short-haul traffic.

Post Office will also be the low-rate service after Jan. 1 only on reinforced domestic and territorial routes. CAB calls any other competitive extending this point beyond low-rate policy to international routes later. But they say Post Office probably cannot or will not shift mail on foreign carriers where U.S. carrier service is available.

New Terminal

Erection of a \$750,000 (preliminary) building at Sacramento Municipal Airport, Calif., is expected to begin in late spring. The city council has authorized preparation of architectural plans.

Exhausting the usual procedure of installing a non-close reference burner into a close reference burner.



reduces
installation
costs

Attached straps are reduced in low drilling drill needed, equipment and installation.

The best showing operation, its active airframe members, is eliminated by installing the close reference.



140-100 140-200 140-300 140-400 140-500 140-600 140-700 140-800 140-900 140-1000 140-1100 140-1200 140-1300 140-1400 140-1500 140-1600 140-1700 140-1800 140-1900 140-2000 140-2100 140-2200 140-2300 140-2400 140-2500 140-2600 140-2700 140-2800 140-2900 140-3000 140-3100 140-3200 140-3300 140-3400 140-3500 140-3600 140-3700 140-3800 140-3900 140-4000 140-4100 140-4200 140-4300 140-4400 140-4500 140-4600 140-4700 140-4800 140-4900 140-5000 140-5100 140-5200 140-5300 140-5400 140-5500 140-5600 140-5700 140-5800 140-5900 140-6000 140-6100 140-6200 140-6300 140-6400 140-6500 140-6600 140-6700 140-6800 140-6900 140-7000 140-7100 140-7200 140-7300 140-7400 140-7500 140-7600 140-7700 140-7800 140-7900 140-8000 140-8100 140-8200 140-8300 140-8400 140-8500 140-8600 140-8700 140-8800 140-8900 140-9000 140-9100 140-9200 140-9300 140-9400 140-9500 140-9600 140-9700 140-9800 140-9900 140-10000 140-10100 140-10200 140-10300 140-10400 140-10500 140-10600 140-10700 140-10800 140-10900 140-11000 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 AERODYNAMIC ENGINEERS
 POWER PLANT INSTALLATION ENGINEERS
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Address correspondence to:
 Northrop Personnel Manager
 Northrop Aircraft, Inc.
 450 Broadway, Hawthorne, Calif.

CAB ORDERS

(Nov. 21/Dec. 6)

GRANTED

Passes for Alaska temporary already and said rate increase of \$161,662 to \$1,052, 150 a year from Oct. 31, 1955 forward.

Transit Alaska temporary already and said rate increase of \$1,072,271, to \$2,671,375, a year from July 1, 1955, forward.

Central Airlines temporary already and said rate increase of \$149,000 from Sept. 15, 1949, to Aug. 31, 1955, a total of \$4,000,668 for the last period. Future temporary rate is projected at \$1,677,255 a year from Sept. 1, 1955 forward.

Texas, Okla., chamber of commerce here to intervene in Poplarville, Ark., service case.

Straw Hat Service exemption to take effect to last tomorrow's month between Los Angeles and Los Cruces, N.M., under contract to the Spanish's Travel Club.

Military charter rights on plane-load limit reduced for 90 of aircraft to Jan. 15, as per agreement by independent CVO association.

CONSIDERED:

Compass Airlines de Antonio's report that CVA estimates modification to its flight ops. as major permit requiring revision of cost cooperation with Pan American World Airways. CAB considers this with the application for approval of interlocking relationships of Trans-Canada, Comair, PAA and certain companies affiliated with Pan American.

EXPANDED INVESTIGATION OF

Atlas Corp., Northeast Airlines, American and Comair, as of NCA's plans with CAB approval involving profit sharing to a non-share firm. The Board questions Atlantic's alleged decision to expand to take in Atlas and/or Comair, which already controlled American.

Charles W. W. and Columbia, Ohio, service to actual, ports of Lake Central Airlines application.

APPROVED:

The American World Airways not permitted to operate Transair's interlocking relationship in a director of Panair do Brasil.

SUSPENDED:

American Airways and Quaker City to give application for reduced loads on its toll routes.

Nonskeds Win Right To Fly First-Class Mail

Airline and airfreight airlines have won a legal battle that puts them in position to bid for a share of first-class mail. The Post Office Department says by its.

Civil Aeronautics Board can grant temporary rights to any carrier to fly first-class mail on a three-day basis. The Board retains the right to set

Safety Record

The 1955 safety record of U. S. scheduled airlines shows a decrease of about 100% over the longest hot month set during the previous 12 months period.

For the 12 months ended Nov. 30, the airlines carried 31,508,545 persons, 18,425,331,000 passenger miles. Passenger deaths totaled 25 for local, continued, nonstop and international services.

Fatality rate per 100 million passenger miles in the last 12 months stood at 0.45, compared with 0.96 per the period ended Nov. 30, 1952. For domestic operations the 1955 rate is 0.58, for 1952 it was 0.55. For international, the rate is .95 for 1955 and 1.80 for 1952.

rate of compensation—over for a non-scheduled carrier.

Postmaster General Arthur Sweeney told Congress last November that he planned to ask a law change to permit annual contracting at rates when there were no CAB, but he has not formally requested such legislation.

Legal Reilly Osh—Majority opinion of CAB said: "This decision will deal with the legal question of whether a carrier is prohibited from service not permitted by the Board to a person who does not hold any certificate authorizing such transportation."

Member Harold Dwyer, Jack Lee and Joseph Adams are the majority.

Chairman David Ross and Chief Clerk George Deane. The vote: "There is no way to square the carrier's action with the recently legislated Civil Aeronautics Act, which Congress adopted in 1938 and which allows full rate increases as the Civil Aeronautics Board in the administration of that statute."

Post Office Move—Senator Reid had urged the Board request to vote as it did on the legal question of whether CAB has the power to exempt an airline that is not certificated to carry mail as the public interest.

Big question now is whether the Postmaster General will follow up by asking the Board to grant such rights to any carrier non-certificated service. What then Washington attention do not expect CAB to act upon carrier requests for exemption to participate in the Post Office program of moving first-class mail by air between certain cities (Airways Week Sept. 26, p. 28). If Sweeney filed with CAB to grant such rights to any airlines the decision of the Board is expected to be close.

Carrier Complaint-Flying Taps Lee president Robert Pasco says: "If the CAB follows through once with grants of exemption for our carrier to take part in this experiment, as we believe they will, a tremendous added capacity will be available to the Post Office Department for contact of its critically new service. This would be of special public benefit in the Christmas rush."

Railroad Airlines vice president, Philip Moore, tells CAB's legal opinion and says his carrier "has had under study for some months the problem of specially designed air transport services which will permit meeting setting of mail." Moore tells a Post Office Department spokesman that the last subject mentioned on the experimental air service will handle all or nearly all the personnel and cargo mail shipped during the Christmas season in the New York-Chicago and Washington-Chicago routes.

SHORTLINES

Alhambra Airlines has developed a system to carry passengers before they depart from their home, office or hotel by the airport where flights are scheduled.

Argentine Airlines (Aerolineas Argentinas) has been authorized to operate weekly passenger, cargo and mail service between Buenos Aires and Lima, with calls at Belivo.

Hydrex Oceanic Airways Corp. will begin Coast service from London to Nassau, Fort Myers, in April, the fifth BOAC route served by Hydrex's jet transport.

Hong Kong's Ka Tak Airport reports an increase of 22.7% in traffic from July to September over the previous quarter.

International Civil Aeronautics Organization's council will meet at Strasbourg, France, next spring to discuss coordination of European Air Transport.

Pan American World Airways has ordered DC-7s with Constellation on Houston-New Orleans Premium tourist flights.

Philippine Air Lines has been granted traffic rights between Manila, Los Angeles, and London.

Scandinavian Airlines System has concluded an agreement with a chartering line to provide Alaska-based passengers with air-sea travel at reasonable discounts.



Northrop's Prime Equation

Northrop Aircraft production operations involve and utilize many unique, cost-saving methods. The "half-shell" assembly technique, illustrated above, permits free installation of equipment in Scorpion F-89 interceptors now in production. Equations are used to solve problems. At Northrop Aircraft, the prime equation combines teams of adaptability, outstanding scientists, and production specialists with modern industrial and research facilities. The combination efficiently converts imagination and knowledge into actual control of advanced design and inimitable values.

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Big Problems for Business Flying

Although the positive notes in executive or business aircraft operations is still flourishing, design errors are flying, and few of us are handling.

Manufacture growth is hampered by an acute lack of basic information which, if it continues, can stunt the growth of this vital field of aviation indefinitely. There is still time for action, but not much.

Some widely accepted statistics about business flying are misleading or unfounded, yet these are used for lack of better data-at basic information. All data disseminated on this subject must be analyzed carefully.

Unless business flying is studied and understood properly and completely it must stand the risk of an optimistic and unbalanced analysis that it is not quite everything its promotion-minded enthusiasts have painted it.

These set back words from an aviation magazine that believes there is a big future for the kind of flying. But hard work and studies at this time, or the technical and economic progress of aviation will pay off executive flying.

If accurate and adequate information, properly measured and assimilated, is not sought soon, there can be little understanding of objectives by both operators and manufacturers of business aircraft. This lack of information is felt especially by the manufacturers.

In fairness to makers of many planes in current use it must be said that by no means are all users dissatisfied. Scores of small aircraft are meeting their owners' needs. But pilots and owners of business planes generally are becoming more impatient in their plea for production of at least one multi-engine type designed 100% for the business or executive market. They claim a guaranteed market of at least 300 planes.

At this point, however, the uncertainty exists, according to Frank Shea, Jr., one of *Aerospace Week's* editors, who has been assigned to make a continuing study of the business flying field. Shea reports that ideas are many and dreams as to the best possible aircraft. Often, thinking appears to be based more on individual desires than on practical requirements. Part of this is chargeable, again, to lack of basic information on which to build valid requirements.

Certainly, there was no unanimity expressed by the pilots attending the recent annual meeting of the National Business Aircraft Assn., and one interested member signified his willingness to spearhead a separate inquiry if the association does not take adequate action to tell manufacturers the needs of corporate flying.

In addition to the lack of data, a big block to hampering out the new design is the absence of a common medium for exchanging ideas and information. Without such organization of individual requirements, Shea considers it doubtful that this new business plane will ever get to be in the drawing board, and the larger and speedier elements of the business aircraft fleet will continue to require modified development steps that become relatively slower every year as new, better and

more comfortable airplanes enter the picture. And then come the jet transports!

With no other outlook than continued use of so-called vehicles-maintained by spare parts from junk dealers, perhaps-business flying can look forward to nothing more than mediocre growth in the long term. Like the air cargo field, it must have an efficient vehicle to capitalize on the growth that is waiting around the corner. Year by year, meanwhile, new passengers are being well paid cruising speeds up to 430 and 500 mph or better.

With these new airline speeds, improved comfort, more frequent schedules, how many business firms will decide to buy or lease 200-400-company planes? The answer is obvious.

If the business flying industry fails to see that the vision is filled, how can we blame the airlines if they overlook this business opportunity?

The air carrier has experienced management, flight personnel, communications systems, operations department maintenance facilities, pilot departments, experienced know-how, not to forget engineering and flying abilities, which could bring about intelligently designed executive ships that could be leased or contracted.

The business flying field has some long-range thinking to do soon here on if it is to grow as rapidly as the rest of aviation. Otherwise it is doomed to secondary aircraft and a secondary future until the right group, with business acumen and sound basic information, takes over.

Unusual Talk About the Weather

Everybody in aviation talks about the Weather Bureau but nobody has ever seemed to do anything about it.

Accuracy or inaccuracy of forecasts is always a top subject for debate and growing among pilots.

The last person most of us would expect to have made public confession of a slipup in a forecast would be the chief of the bureau himself. In the past, too many reports from the bureau—if any were forthcoming at all—have been shaky.

Yet Dr. F. W. Rothenkelder told the paper frankly that the violent snow and wind storms that hit the New York City area, closing airports, had taken his people by surprise. The original forecast for that day had been all right only "if you didn't look at the windows," he said candidly.

Furthermore, he added, he intended to find out why the bureau didn't see that storm coming.

A week later, the investigation was still under way. "We expect to learn a lot from it," the doctor said.

Most pilots can remember many confessions on forecasts—some that were up diagrams to life and limb. But we don't recall any other bureau spokesmen anywhere who frankly and publicly admitted to cover up for a failure. Dr. Rothenkelder deserves congratulations. We hope the essence of the investigation are made public, and that remedial action is forthcoming.

—Robert H. Wood

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Training the men behind the men who fly the jets



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engineers and technicians from aircraft builders and our own organization.

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Yes, thousands of the men behind the men who fly the jets proudly wear the badge, "Allison Technical School Graduate."



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